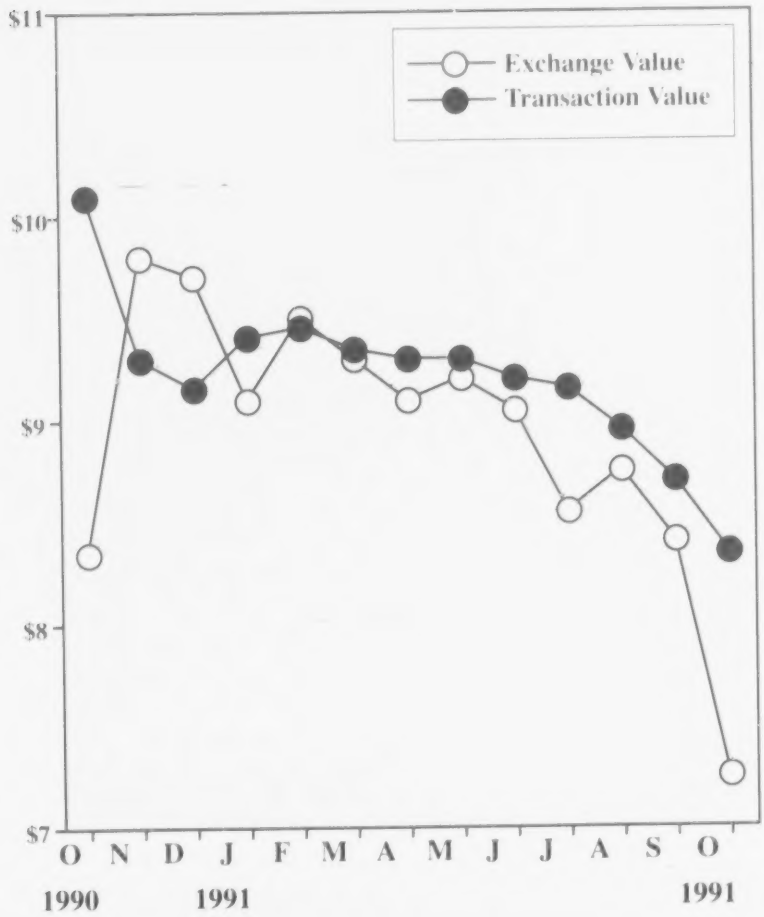
NUEXCO

Monthly Report

November 1991 Number 279

World Nuclear Generating Capacity and Uranium Requirements to 2005 18

Hungary: Meeting Electricity Needs With Nuclear Power 26



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- **World Nuclear Generating Capacity and Uranium Requirements to 2005**

NUEXCO forecasts installed nuclear electric generating capacity to grow at an average rate of 2.4 percent per year and to reach 448 GWh by 2005. This capacity growth will cause world uranium requirements to grow, exceeding 200 million pounds equivalent U_3O_8 by 2005.

Focus 26
- **Hungary: Meeting Electricity Needs With Nuclear Power**

Hungary relies on imports for almost one-third of its electricity supply. While the Paks nuclear station already provides over 50 percent of the country's domestically generated electricity, the government has recognized that its dependence on energy imports make nuclear power even more important and it is examining nuclear as a source for additional generating capacity.

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To Our Readers

Coalition Files Anti-Dumping Petition

On November 8, 1991, certain uranium producers with US production, and the Oil, Chemical, and Atomic Workers Union, filed a petition with the US Department of Commerce and the US International Trade Commission charging that uranium is being dumped in the United States by the Soviet Union and the individual Republics that are part of the U.S.S.R. The petition claims that Soviet trade practices are causing injury and threatening further injury to the US uranium industry. The case applies to all natural and enriched uranium from the Soviet Union and seeks anti-dumping duties on all such imports.

The antidumping petition will be determined by two US government agencies, the Department of Commerce and the International Trade Commission. If the Department of Commerce finds that "dumping" (sales in the USA at less than fair value) of Soviet natural or enriched uranium have taken place, and the International Trade Commission finds that these imports have caused or threatened material injury, then future uranium imports from the Soviet Union of Soviet-produced uranium will be subject to additional duties. In such case, antidumping duties would go into effect in the spring of 1992. NUEXCO has always favored open trade without government intervention. NUEXCO believes this petition is unfounded, and, therefore, opposes it.

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Market Values Summary

NUEXCO Market Values	This Report October 31, 1991	Last Report September 30, 1991	12 Months Ago October 31, 1990
EXCHANGE VALUE [1]	**$7.25** / lb equivalent U_3O_8	$8.40	$8.35
UF_6 VALUE [2]	**$22.75** / kg U as UF_6	$25.50	$24.75
LOAN RATE [3]	**3.5%** / annum	3.5%	3.5%
CONVERSION VALUE [4]	**$1.55** / lb U as UF_6	$1.55	$1.45
SWU VALUE [5] **(0.3 % tails assay)**	**$68** / SWU	$67	$51
TRANSACTION VALUE [6]	**$8.35** / lb equivalent U_3O_8	$8.70	$10.10
Transactions	**22**	20	12
Months	**3**	3	3
Millions of Pounds	**4.6**	4.4	2.3

DEFINITIONS

1 The **Exchange Value** is NUEXCO's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

2 The **UF_6 Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

3 The **Loan Rate** is NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

4 The **Conversion Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

5 The **SWU Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

6 The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

a) Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;

b) At least ten transactions;

c) Transactions involving a sum total of at least 2 million pounds equivalent U_3O_8.

DERIVATIONS AND COMMENTS

- All **Market Values** are expressed in terms of US$.
- All **Market Values** are based on:
  - Data from recently completed transactions.
  - Data from pending transactions.
  - Firm bids to buy or borrow, and firm offers to sell or lend.
  - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these **Market Values**.
- In the determination of prices, NUEXCO does not consider charges for transportation other than that customarily provided by suppliers.
- The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
- For the **SWU Value**, NUEXCO converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight-percent U^{235} and a product assay of 3.0 weight-percent U^{235}, assuming feed costs corresponding to the NUEXCO **Exchange Value** and **Conversion Value** determined as of the same date.
- In calculating the **Transaction Value**, NUEXCO does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future **Exchange Values** or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it can not currently be determined.
- The sample time for the **Transaction Value** is extended as necessary to satisfy the minima for the number of transactions and quantity of material. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

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NUEXCO

MARKET REVIEW

OCTOBER MARKET REVIEW

(as of October 31, 1991)

OVERVIEW

Uranium market prices continued their tumble during October, and the Exchange Value fell to a record low of $7.25 per pound U_3O_8. Limited demand and an abundance of supply offered by multiple suppliers drove the decrease. UF_6 prices also fell as a result of virtually no demand; NUEXCO's UF_6 Value dropped $2.75, to $22.75 per kgU as UF_6.

Six near-term uranium transactions were reported, four involving concentrates, and two involving natural UF_6. These six sales totalled almost 1.1 million pounds equivalent U_3O_8 and raised the 1991 year-to-date market volume to 20.4 million pounds (**Table 1**).

The Conversion Value remained at $1.55 per pound U as UF_6. Two conversion sales totalling over 250 thousand pounds U were reported. The Loan Rate withstood some downward market pressure, and remained at 3.5 percent per annum. Only one loan for a moderate quantity of concentrates was reported.

The SWU Value climbed one dollar, to $68 per SWU, as near-term supplies tightened. Two SWU transactions, both for small quantities, were reported in October.

NATURAL URANIUM AND CONVERSION

Last year's October 31 Exchange Value set a new record low in constant dollar terms, falling to $8.35 per pound U_3O_8. Now, one year later, sellers wish prices would recover to that level; the October 31, 1991 **Exchange Value** dropped to **$7.25** per pound U_3O_8, down $1.15. When adjusted for inflation, this is the all-time record low Exchange Value (**Figure 1**). Low levels of demand throughout the month, combined with aggressive selling by several suppliers, progressively forced the market down to this new low. An additional influence was the expectation of another government-controlled stockpile entering the market. This speculation created an environment in which discretionary buyers were hesitant to conclude deals, in anticipation of further price declines. Although the immediate availability of this stockpile was questionable, during October its impending sale was an important factor.

Overall, however, lack of demand was the crucial factor influencing the market. This demand situation was compounded by several suppliers' eagerness to sell, resulting in record-low prices. But even at these levels, discretionary buyers have been slow to enter the market. Over the past few years, discretionary buyers have made purchases at perceived market bottoms, only to watch prices continue to fall, and as a result, they are now justifiably cautious.

Only four concentrates transactions were reported in October, totalling less than 700 thousand pounds equivalent U_3O_8. Two utilities and two producers purchased material from US sellers. The purchases made earlier in the month occurred at levels slightly above the October 31 Exchange Value. No long-term uranium transactions were reported.

* * *

The **UF_6 Value** also dropped significantly, falling $2.75, to **$22.75** per kgU as UF_6. This 10.8% decline also brings the UF_6 Value to a new all-time low, both in constant dollar and absolute terms, although the UF_6 Value has been published only since April 30, 1985. While supply of UF_6 is somewhat lower compared to the abundance of concentrates, virtually no demand exists for UF_6.

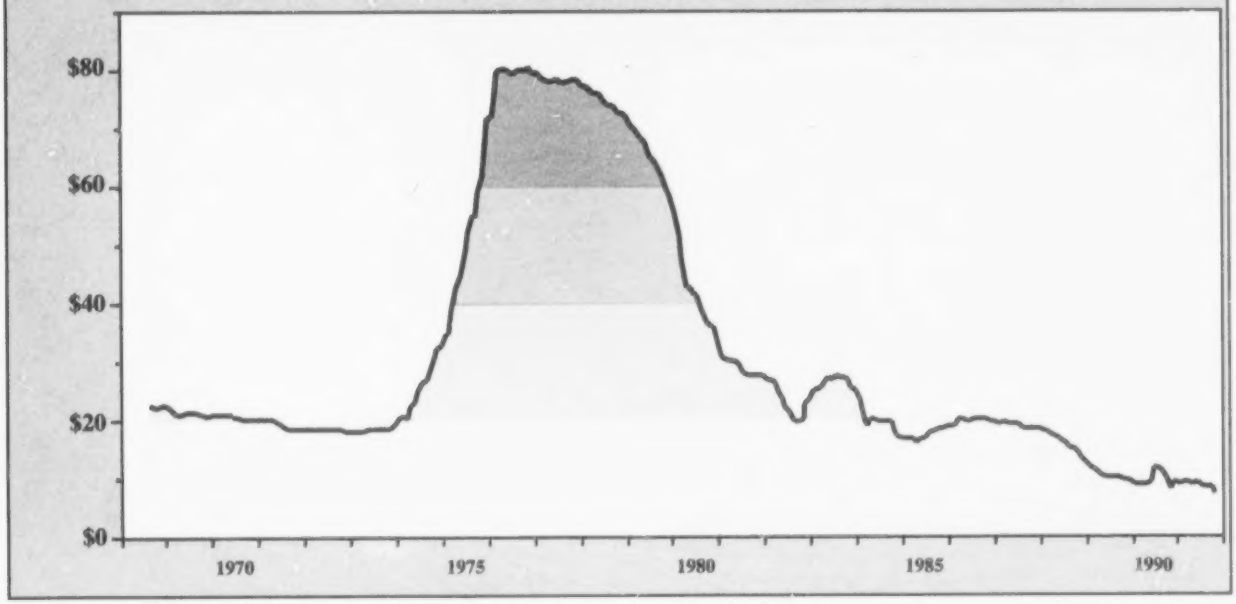
Table 1
NEAR-TERM URANIUM SALES SUMMARY

	October 1991		Year-to-Date	
	No. of Sales	Volume [1]	No. of Sales	Volume [1]
Concentrates	4	0.7	59	12.5
Natural UF_6	2	0.4	20	5.7
EUP	0	0.0	9	2.2
Total [2]	**6**	**1.1**	**88**	**20.4**

[1] Million pounds equivalent U_3O_8

[2] Due to independent rounding, columns may not equal total.

Figure 1
HISTORICAL NUEXCO EXCHANGE VALUE IN CONSTANT 1990 US DOLLARS



Consequently, the UF_6 market is greatly influenced by the concentrates market. Only two natural UF_6 transactions were reported, in which US utilities purchased over 400 thousand pounds equivalent U_3O_8 from intermediaries for delivery before year end. No enriched uranium product sales were reported.

* * *

Table 2
NEAR-TERM SUPPLY/DEMAND SUMMARY

	Active Supply[1]	Active Demand[1]
• Uranium (thousand lbs equivalent U_3O_8)	7,315	1,610
• Supply/Demand Ratio:	4.5	
• Loan (thousand lbs equivalent U_3O_8)	5,485	0
• Conversion (thousand lbs U as UF_6)	880	0
• SWU (thousand SWUs)	400	100

[1] Supply and Demand tables in the Market Review section of this Report provide details for each category.

The **Transaction Value** continued its steady decline, falling $0.35, to **$8.35** per pound U_3O_8 based on 22 transactions over three months involving 4.6 million pounds equivalent U_3O_8. The higher prices and higher volume associated with August's sales continue to buoy the Transaction Value in this declining market.

* * *

Contrary to what might be expected in a falling market, **active uranium supply** increased to **7.3** million pounds equivalent U_3O_8, demonstrating the abundance of supply and the willingness of sellers to provide material, even at these low prices. The low prices have drawn some buyers into the market and **active uranium demand** has begun to increase, rising to **1.6** million pounds equivalent U_3O_8, from last month's level of only 450 thousand pounds. The **supply/demand ratio** declined to **4.5**.

* * *

The **Loan Rate** remained unchanged at **3.5** percent per annum, thus marking four years at the same level. However, several key factors are exerting strong downward pressure on the Loan Rate: very low demand from borrowers, a willingness by several suppliers to lend material, and significantly lower interest rates in the USA.

Only one loan was reported, in which a producer borrowed a moderate quantity of concentrates.

* * *

The **Conversion Value** remained at **$1.55** per pound U as UF_6, as ample supply met any emerging demand at current market levels during October. Two near-term conversion transactions were reported in which European and US utilities purchased moderate quantities of conversion services at prices near the October 31 Conversion Value. In addition, one long-term conversion sale was reported; a utility agreed to purchase a portion of its requirements for 1992 through 1997 from a primary converter.

ENRICHMENT SERVICES

The **SWU Value** climbed one dollar, to **$68** per SWU, as near-term supplies tightened, creating upward pressure on the market. Two enrichment transactions were reported, in which European and US utilities purchased small quantities of SWU from intermediaries. No long-term enrichment sales were reported, although at month end, six buyers continued to evaluate long-term offers for up to 4.8 million SWU for delivery through 2001.

Table 3
ENRICHMENT PRICES
(October 31, 1991)

Prices	This Month Report 279	Last Month Report 278	12 Months Ago Report 267
NUEXCO SWU Value ($US per SWU)	68	67	51
US DOE SWU prices: ($US per SWU)			
USEC	121.50[1]	121.50[1]	117.85[2]
AFC	153.00[3]	153.00[3]	153.00[3]
Requirements	157.00[3]	157.00[3]	157.00[3]
Incentive Price (IP2)	104.67[4]	104.67[4]	100.68[5]
Calculated worth of enriched UF_6[6]: ($US per KgU as UF_6)			
2.0 w/o U^{235}	208	219	190
2.5 w/o U^{235}	292	306	263
3.0 w/o U^{235}	380	396	339
3.5 w/o U^{235}	469	488	416
4.0 w/o U^{235}	560	582	494
4.5 w/o U^{235}	652	677	573

[1] Effective 10/1/91.
[2] Effective 10/1/89 to 9/30/91.
[3] Effective since 10/1/84.
[4] Provisional IP2 for FY92: Effective 10/1/91 to 9/30/92, for up to 30% of annual requirements.
[5] IP2: Effective 10/1/90 to 9/30/91, for up to 30% of annual requirements.
[6] Calculated using the NUEXCO Exchange Value, Conversion Value, SWU Value and 0.30 w/o U^{235} tails assay.

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RECENT TRANSACTIONS

Uranium Sales [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range [2] of Current Exchange or UF_6 Value	Buyer	Seller	Remarks
5261	1991	101-300	90-97	Producer	Producer	
5267	1991	101-300	103-110	Utility	Intermediary	
5268	1991	101-300	103-110	Utility	Intermediary	UF_6
5272	1992	50-100	103-110	Producer	Intermediary	
5274	1991	101-300	98-102	Utility	Intermediary	UF_6
5275	1992	101-300	103-110	Utility	Intermediary	

Natural Uranium Loans [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range [2] of Current Loan Rate	Borrower	Lender	Remarks
5266	1991	101-300	R	Producer	R	

Conversion Sales [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U equivalent)	Price Within Percentage Range [2] of Current Conversion Value	Buyer	Seller	Remarks
5270	1992-1997	3,001-5,000	See Remarks	Utility	Convertor	Base Escalated
5276	1991	101-300	98-102	Utility	Convertor	
5279	1992	50-100	90-97	Utility	R	

Enrichment Sales [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity [3] (thousand SWU)	Price Within Percentage Range [2] of Current SWU Value [4]	Buyer	Seller	Remarks
5271	1992	Less than 50	98-102	Utility	Intermediary	
5273	1992	Less than 50	98-102	Utility	Intermediary	

R means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

[2] The ranges *Below 90, 90-97, 98-102, 103-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Market Value. The endpoints of each range are included within that range.

[3] If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 % tails assay.

[4] Prices are usually normalized to 0.30 % tails assay. When prices and SWU values are expressed as discounts from a reference price (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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MARKET REVIEW

SUPPLY AND DEMAND

Uranium Supply

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
AVAILABLE TO PURCHASE:				
ACTIVE				
90-1227	500	—	1991	
90-1307	330	—	1991	
91-1215	785	—	1992	
91-1502	500	—	1991	
91-1505*	1,000	—	1991	
91-1506	500	—	1991	
91-1507	500	—	1991	
91-1511*	260	—	1991	UF_6
91-1512*	785	—	1991	UF_6
91-1513*	1,000	—	1991	
91-1241*	655	650 per year	1992-1996	
91-1503A	500	3,500	1991-1993	UF_6c
TOTAL	**7,315**			
INACTIVE	**3,930**			
AVAILABLE TO LOAN:				
ACTIVE				
91-1084	3,900	—	—	U_3O_8
91-1219	260	—	—	U_3O_8
91-1220	325	—	—	UF_6
91-1174*	1,000	—	—	U_3O_8
TOTAL	**5,485**			
INACTIVE	*None reported*			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: *none*

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SUPPLY AND DEMAND

Uranium Demand

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
INQUIRIES TO PURCHASE:				
ACTIVE				
90-1304*	175	—	1992	
91-1234*	25	—	1992	U_3O_8/UF_6
91-1235*	400	—	1991-1992	U_3O_8/UF_6
91-1246*	100	—	1991	
91-1249*	50	—	1991-1992	
91-1256*	120	—	1991-1992	
91-1257*	100	—	1992	
91-1258*	240	—	1992	
91-1259*	400	—	1992	
91-1118	—	300 per year	1993-1998	U_3O_8/UF_6
91-1184	—	350 per year	1993-1997	
91-1197	—	2,210	1992-1997	U_3O_8/UF_6
91-1227A	—	60	1992-1994	UF_6e
91-1245*	—	1,000	1993-1997	
91-1255*	—	2,250	1993-1996	
TOTAL	**1,610**			
INACTIVE	**1,595**			
INQUIRIES TO BORROW:	*No inquiries to borrow are reported*			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: 91-1209, 91-1214, 91-1223, 91-1229

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MARKET REVIEW

SUPPLY AND DEMAND

Conversion Supply and Demand

NUEXCO Project Number	Quantity (Thousand Pounds U as UF_6) Within 3 Years[1]	Beyond 3 Years[1]	Delivery Period	Remarks
AVAILABLE FOR SALE:				
ACTIVE				
91-1500*	440	—	1991	
91-1501*	440	—	1991	
TOTAL	880			
INACTIVE	*None reported*			

INQUIRIES TO PURCHASE: *No inquiries to purchase are reported*

* New or revised since last month.

[1] Measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: 91-1170, 91-1202, 91-1221

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SUPPLY AND DEMAND

SWU Supply And Demand

NUEXCO Project Number	Quantity (Thousand SWUs) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
AVAILABLE FOR SALE:				
ACTIVE				
90-1078D*	200	—	1991	UF6e
91-1509	200	—	1992	
TOTAL	**400**			
INACTIVE	**935**			
INQUIRIES TO PURCHASE:				
ACTIVE				
91-1187*	100	—	1992	
90-1196	—	60 per year	1995 on	
91-1027	—	55 per year	1996-2000	
91-1094B	—	385 per year	1994-1995	UF6e
91-1142	—	75 per year	1995-2000	
91-1199	—	385 per year	1996-2000	
91-1232*	—	400	1993-1994	
91-1250*	—	45	1993	UF6e
91-1066	—	320	1995-2000	
91-1152	—	2,700	1995-2001	
91-1171	—	560	1995-1998	
91-1227B	—	35	1992-1994	UF6e
TOTAL	**100**			
INACTIVE	**265**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: 91-1206, 91-1210, 91-1211, 91-1218, 91-1224, 91-1500

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MARKET REVIEW

MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

Exchange Value[1]

Country (currency)	per lb equivalent U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)
Australia (dollar)	9.21	10.51	10.65	23.93	27.33	27.69
Belgium (franc)	249.40	287.97	260.12	648.38	748.65	676.27
Canada (dollar)	8.15	9.50	9.74	21.18	24.71	25.33
EC (ecu)	5.94	6.82	6.16	15.43	17.73	16.02
Finland (markka)	29.58	34.06	30.06	76.90	88.55	78.15
France (franc)	41.43	47.63	42.29	107.72	123.82	109.95
Germany (mark)	12.13	13.97	12.63	31.52	36.32	32.85
Italy (lira)	9,084	10,456	9,465	23,617	27,182	24,607
Japan (yen)	948.33	1,116	1,075	2,465	2,901	2,794
Netherlands (guilder)	13.66	15.75	14.24	35.50	40.95	37.03
So. Africa (comm. rand)	20.54	23.56	21.26	53.39	61.26	55.28
So. Korea (won)	5,438	6,111	5,971	14,137	15,888	15,522
Spain (peseta)	762.68	885.80	791.54	1,983	2,303	2,058
Sweden (krona)	44.51	51.00	46.91	115.71	132.59	121.96
Switzerland (franc)	10.65	12.18	10.70	27.68	31.66	27.81
Taiwan (dollar)	188.50	220.08	223.61	490.05	572.16	581.35
UK (pound)	4.17	4.80	4.27	10.84	12.47	11.11
US (dollar)	7.25	8.40	8.35	18.85	21.84	21.71

Transaction Value[1]

Country (currency)	per lb equivalent U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)
Australia (dollar)	10.60	10.89	12.88	27.57	28.31	33.49
Belgium (franc)	287.24	298.25	314.64	746.75	775.39	818.00
Canada (dollar)	9.38	9.84	11.79	24.39	25.59	30.64
EC (ecu)	6.84	7.06	7.45	17.78	18.37	19.38
Finland (markka)	34.07	35.28	36.36	88.57	91.72	94.53
France (franc)	47.72	49.33	51.16	124.06	128.24	133.00
Germany (mark)	13.97	14.47	15.28	36.31	37.62	39.73
Italy (lira)	10,462	10,829	11,449	27,200	28,153	29,764
Japan (yen)	1,092	1,156	1,300	2,840	3,005	3,379
Netherlands (guilder)	15.73	16.31	17.23	40.89	42.41	44.79
So. Africa (comm. rand)	23.65	24.40	25.72	61.50	63.44	66.86
So. Korea (won)	6,263	6,330	7,222	16,282	16,455	18,776
Spain (peseta)	878.39	917.43	957.44	2,284	2,385	2,489
Sweden (krona)	51.26	52.82	56.74	133.26	137.33	147.52
Switzerland (franc)	12.26	12.61	12.94	31.88	32.79	33.64
Taiwan (dollar)	217.10	227.94	270.48	564.41	592.59	703.19
UK (pound)	4.80	4.97	5.17	12.48	12.92	13.43
US (dollar)	8.35	8.70	10.10	21.71	22.62	26.26

[1] As of May 1991 Report #273; calculated using currency exchange rates for the last business day of the month, as published in *The Wall Street Journal*. Prior to May 1991 Report #273; calculated using currency exchange rates published in *The Wall Street Journal* on the last business day of the month.

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MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

Conversion Value[1]

Country (currency)	per lb U as UF_6			per kg U as UF_6		
	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)
Australia (dollar)	1.97	1.94	1.85	4.34	4.28	4.08
Belgium (franc)	53.32	53.14	45.17	117.55	117.15	99.59
Canada (dollar)	1.74	1.75	1.69	3.84	3.87	3.73
EC (ecu)	1.27	1.26	1.07	2.80	2.77	2.36
Finland (markka)	6.32	6.29	5.22	13.94	13.86	11.51
France (franc)	8.86	8.79	7.34	19.53	19.37	16.19
Germany (mark)	2.59	2.58	2.19	5.72	5.68	4.84
Italy (lira)	1,942	1,929	1,646	4,282	4,253	3,624
Japan (yen)	202.75	205.93	186.62	446.98	453.99	411.42
Netherlands (guilder)	2.92	2.91	2.47	6.44	6.41	5.45
So. Africa (comm. rand)	4.39	4.35	3.69	9.68	9.59	8.14
So. Korea (won)	1,163	1,128	1,037	2,563	2,486	2,286
Spain (peseta)	163.05	163.45	137.45	359.47	360.35	303.03
Sweden (krona)	9.52	9.41	8.15	20.98	20.75	17.96
Switzerland (franc)	2.28	2.25	1.86	5.02	4.95	4.10
Taiwan (dollar)	40.30	40.61	38.83	88.85	89.53	85.61
UK (pound)	0.89	0.89	0.74	1.97	1.95	1.64
US (dollar)	1.55	1.55	1.45	3.42	3.42	3.20

SWU Value And UF_6 Value[1]

Country (currency)	SWU Value at 0.30 % Tails Assay			UF_6 Value per kg U as UF_6		
	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)	This Month (Oct 31, 1991)	Last Month (Sept 30, 1991)	12 Months Ago (Oct 31, 1990)
Australia (dollar)	86.35	83.85	65.05	28.89	31.91	31.57
Belgium (franc)	2,339	2,297	1,589	782.59	874.19	771.03
Canada (dollar)	76.40	75.81	59.52	25.56	28.85	28.88
EC (ecu)	55.68	54.40	37.64	18.63	20.71	18.27
Finland (markka)	277.44	271.68	183.60	92.82	103.40	89.10
France (franc)	388.62	379.88	258.32	130.01	144.58	125.36
Germany (mark)	113.73	111.43	77.17	38.05	42.41	37.45
Italy (lira)	85,202	83,396	57,810	28,505	31,740	28,055
Japan (yen)	8,895	8,901	6,564	2,976	3,388	3,185
Netherlands (guilder)	128.08	125.63	87.00	42.85	47.82	42.22
So. Africa (comm. rand)	192.63	187.94	129.87	64.45	71.53	63.03
So. Korea (won)	51,001	48,745	36,468	17,063	18,552	17,698
Spain (peseta)	7,153	7,065	4,835	2,393	2,689	2,346
Sweden (krona)	417.43	406.80	286.52	139.66	154.83	139.04
Switzerland (franc)	99.85	97.14	65.33	33.41	36.97	31.71
Taiwan (dollar)	1,768	1,755	1,366	591.49	668.10	662.81
UK (pound)	39.10	38.26	26.09	13.08	14.56	12.66
US (dollar)	68.00	67.00	51.00	22.75	25.50	24.75

[1] As of May 1991 Report #273; calculated using currency exchange rates **for** the last business day of the month, as published in *The Wall Street Journal*. Prior to May 1991 Report #273; calculated using currency exchange rates published in *The Wall Street Journal* **on** the last business day of the month.

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RECENT DEVELOPMENTS

WASHINGTON FOCUS

by Linda L. Gunter

The House of Representatives was active this month in considering uranium enrichment restructuring legislation: the House Energy & Power Subcommittee marked up Rep. Philip Sharp's (D-IN) proposal to restructure DOE's enrichment program and the Interior Committee's Energy & Environment Subcommittee held a hearing on this same issue October 29. The House also voted October 30 to reauthorize the Export Administration Act. At the end of the month, the National Academy of Science report on alternative uses for AVLIS technology became public. The Senate attempted consideration of the National Energy Strategy bill (S 1220) sponsored by Sen. J. Bennett Johnston (D-LA) and Sen. Malcolm Wallop (R-WY). However, when the bill reached the Senate floor on November 1, filibuster threats from Senators opposed to opening the Arctic National Wildlife Refuge to oil drilling were successful in preventing the Senate from debating the issue and voting on the bill as a package.

House Energy Subcommittee Markup of Enrichment Restructuring Bill

On October 17, the House Energy & Power Subcommittee marked up Rep. Sharp's uranium enrichment restructuring bill. This bill would create a government corporation that would retain DOE's current contracts and their revenue, could purchase SWU or enriched uranium product, and could lease the Gaseous Diffusion Plants (GDP) to produce SWU. A working capital fund of $364 million would be provided by the government and be returned with interest to the Treasury over a 20-year period.

The bill would not allow the Corporation to issue bonds to fund construction of any enrichment facilities, and although predeployment demonstration activities for AVLIS could continue, no commercial scale facility could be built until the Corporation was privatized. Presumably this requirement is to prevent the Corporation from remaining a government entity while it deploys AVLIS, thus placing all the financial risk with the private sector.

The controversial creation of a fund for decommissioning and decontamination (D&D) of the gas diffusion plants was left to the full Energy & Commerce Committee to resolve. Rep. Sharp's proposal creates a fund sufficient to cover the current estimate of D&D cost—$20 billion for the three plants. This figure is reportedly DOE's estimate of total D&D, although the D&D report Ebasco Corporation has prepared under contract to DOE has not been made public. In order to raise the money, Rep. Sharp has calculated the Corporation must contribute $500 million per year (indexed to inflation) to a D&D fund. The $500 million would be raised by a combination of leasing payments on the GDPs, royalty payments for AVLIS, annual payment on the $364 million Treasury loan, and if not enough money is accumulated from those sources, a millage fee assessed on nuclear power plants. At the markup, Rep. Carlos Moorhead (R-CA) offered a counter-proposal which was accepted, and provided a means of deferring debate on the issue until full committee consideration. The Moorhead amendment retains all of the provisions except the millage fee. In its place would be a retroactive fee on DOE's enrichment customers, "subject to a DOE rulemaking". No mention is made of a military share, although the bill does allow the Corporation to collect for D&D in its SWU prices to the military. Rumors persist of a new DOE bill to reflect D&D numbers greater than the $3 billion historically projected, and a mechanism for its collection, but the difficulty of collecting money for a fund of $20 billion or more may make the Corporation's SWU prices so uncompetitive that DOE may not want to release the bill.

Rep. Sharp's uranium enrichment restructuring bill was voted out of committee, 21 to 1, with only Rep. Mike Synar (D-OK) opposing it. Rep. Sharp has incorporated

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this proposal in his larger energy policy bill (HR 776), so the proposal has not been introduced as separate legislation and thus does not have a number of its own. The Subcommittee has completed its work on the entire energy package, but the full committee will not begin consideration of the bill until next year.

Interior Subcommittee Hearing on Enrichment Restructuring

The House Energy & Environment Subcommittee, chaired by Rep. Peter H. Kostmayer (D-PA), held a hearing October 29 on various bills to restructure DOE's uranium enrichment program into a government corporation. Rep. Kostmayer plans to introduce his own enrichment bill within the next two weeks. The first witnesses were congressmen with GDPs in their districts: Rep. Carroll Hubbard (D-KY) and Rep. Bob McEwen (R-OH). They have introduced legislation for the Bush Administration (HR 145) creating a government corporation. Both witnesses stressed DOE's lack of competitiveness in the world market, and the need to have a domestic industry to help the US trade balance, ensure energy independence, and preserve US national security.

The next witness was DOE Assistant Secretary for Nuclear Energy, William Young, who was questioned about DOE's estimate of the cost of D&D of the GDPs. The Subcommittee had obtained several versions of a study for DOE conducted by Ebasco Corporation on these costs, and the different versions contained cost estimates varying from $20 billion to $45 billion. Rep. Kostmayer wanted a clarification of which estimate DOE plans to use, but Mr. Young was unable to respond adequately to the Committee because the administration is still struggling to establish its policy on D&D. Part of the problem is that the Ebasco report considers D&D, environmental cleanup, and tailings cleanup costs, whereas the figures DOE has publicly referred to apply only to the cost of D&D. The initial estimate for D&D costs may have been calculated in current (1992) dollars, but the actual cost of cleanup could be well beyond whatever number DOE projects this year. Mr. Young promised that the final study and DOE's new legislation will be made public in "several weeks".

In later statements, representatives of GAO clarified some of the confusion about the various D&D estimates. GAO characterized the high numbers included in the first draft of the Ebasco report as a "worst case scenario". DOE was able to have Ebasco reduce the estimate of D&D costs by making some policy decisions altering some of the basic assumptions underlying the analysis, such as removing the necessity to restore the GDP sites to their original condition (greenfielding). GAO testified that the latest version of the Ebasco report has $16.1 billion for D&D, $4.5 billion for remedial action, and $1.5 billion for tailings cleanup, which totals $22.1 billion. GAO believes these lower numbers were developed as DOE's review of the contractor report progressed and other assumptions, such as the need to build D&D facilities at all three sites, were eliminated. A concept called "prompt dismantlement" replaced greenfielding, further reducing the cost estimates. GAO testified it expects the final cost to be higher, based on past experience with government estimates. GAO is working on its own D&D analysis and plans to publish a report early next year.

On another topic, Chairman Kostmayer questioned Mr. Young about the allocation of D&D costs to its enrichment customers. This allocation is also part of the contractor report, and thus is not yet public. However, Mr. Young did seem to

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indicate that the report confirms that most of the contamination at the GDPs resulted from the initial operation of the plants when used solely for government (defense) purposes. Thus, it might be more equitable to allocate a greater portion of the cleanup costs to the government (taxpayer) for funding. When asked how the customers should pay their portion of the fund, Mr. Young acknowledged that the utilities object to a millage fee because they feel it is not equitable, and DOE has not yet made its policy decision. Kostmayer noted if the Corporation tries to collect either $20 or $40 billion solely through SWU prices, the corporation will be uncompetitive. However, Rep. Sharp's proposal to collect $500 million per year creates a fund of about $20 billion in 15 years, employing earnings attained through pricing as well as the millage fee, if required. DOE either has not, or will not, release any market analysis indicating what the SWU price will be if the Corporation is forced to collect the $20 billion.

Representing the industry, Joseph Paquette, CEO of Philadelphia Electric Company, said the utilities support making a contribution to D&D that is equitable and represents a fair assessment of past usage of the enrichment plants. He explained that the industry opposes a millage fee as a means of collecting the customers' share of the money, because a millage fee does not reflect past services to foreign customers and thus, is not equitable. He also questioned the credibility of the Ebasco Corporation study, indicating it had been done over too short a period of time, and without taking any soil samples. Paquette asked Congress to authorize an independent agency, such as the National Academy of Sciences, to undertake a D&D study. The study should collect more data and look into the causes of the contamination. Rep. Kostmayer agreed that an independent assessment may be valuable. However, as the Academy is not really capable of independent scientific analysis, it would have to hire contractors, or more likely, review data already collected by DOE's contractors.

House Passes Export Administration Act

On October 29, the House passed a bill reauthorizing the Export Administration Act. This bill addresses trade in sensitive technology such as telecommunications and other products listed on the government-regulated COCOM list. The bill contains an amendment (sponsored by Rep. Wolpe) that would severely curtail nuclear trade if it is enacted. The State Department has expressed concern about the amendment, because it believes the change would end nuclear technical assistance to east European countries and would allow trade only with countries with which the USA has a full-scope nuclear cooperation agreement. An additional requirement of the amendment contains probably the most sweeping language yet introduced to limit nuclear trade. This amendment requires the President to impose sanctions on any "country" violating measures adopted by the London Suppliers Group, an organization that establishes international guidelines for nuclear trade. This stipulation would mean that if it were determined that a company sold nuclear technology to Iraq, *all* nuclear trade by the country of origin would be sanctioned, not just the company's trade. This measure would "kill" all of the State Department's current multi-lateral efforts within the London Suppliers Group on dual-use exports, because the amendment mandates US sanctions. If the House bill were to become law, the result would be that the US government would have less influence over trade in these areas, and thus, proliferation concerns could expand.

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Another potentially objectionable area of the amendment concerns the sale of HEU to research reactors. The amendment stipulates that all research reactors convert to LEU. The State Department has explained that not all research reactors are able to convert to LEU, and that requiring the US government to develop alternate fuels is not practical. The amendment does not allow for the possibility that in some countries neither alternative exists, conversion to LEU or alternate fuels, and thus would prevent sales to these countries entirely. If DOE's customers cannot get their HEU from the USA because of this bill, they simply may go to other sources. These customers, consisting primarily of US allies, view this as more US meddling in their domestic policy.

In general, when compared with current law, the proposed amendment limits Presidential discretion when dealing with other countries on nuclear trade. The administration opposes this aspect of the bill as well as some other provisions, such as telecommunication sales to the USSR, and unless the bill is modified, it probably will bring a Presidential veto.

NAS Report on Alternative Uses for AVLIS

During October, the National Academy of Sciences (NAS) released its report on alternative uses for AVLIS. After a two-day briefing last year at Lawrence Livermore National Laboratories (LLNL), eight companies and two federal organizations submitted seventeen alternative AVLIS applications. NAS has apparently reviewed these alternatives, but makes no mention of them specifically in the report. Of the sixteen recommendations made, the primary recommendation is that DOE and the national laboratories "should allow industry to play a greater and an earlier role in the definition and development of the technology, if the USA is to derive significant commercial benefit from research done at the labs." It also suggests that in order to foster technology transfer, industry should "design and manufacture as many components and subsystems as is practical." Another recommendation is that, although the market may have to be created, it appears there are a number of isotopes that can be separated for commercial purposes, including gadolinium, zirconium, hafnium, and carbon. For instance, isotopically pure carbon is used to produce diamonds, which can be used in a variety of industrial processes, such as fabrication of ultrasharp cutting knives for metal machining used in the optics and nuclear industries. Other isotopes derived from the process may have medical or research uses.

The technology developed for AVLIS, such as the laser and separator systems and their components and subsystems, has other industrial uses as well. In particular, the report indicates the technology of handling high-temperature corrosive materials constitutes "a national resource which should be made available to industry." Another recommendation is that LLNL should establish a user facility to provide beam time and technical support for the laser systems. Several chemical companies are already exploring use of the lasers via the Cooperative Research and Development Program that may provide access to the technology. Although the Academy report does not look at nuclear fuel uses for AVLIS, the final recommendation notes that alternative uses for AVLIS could pose a proliferation risk particularly in the production of isotopes of metallic elements.

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INDUSTRY BRIEFS

Taiwan AEC Conditionally Approves New Reactors

Taiwan's Atomic Energy Commission (AEC) has approved the Environmental Impact Assessment for Taiwan Power Company's (Taipower) plan for its seventh and eighth reactors.

The AEC gave its approval based on Taipower's compliance with over 40 conditions. The extensive list of conditions included: a thorough plan to improve safety-related equipment and procedures; improved public trust with full disclosure of safety-related information; improved maintenance and the establishment of a maintenance training center; regular evaluations of plant operations and performance with immediate correction of any deficiencies; more research and development; greater technology transfer; improve staff experience and diversity by bringing in engineers from outside Taipower; revision of its career development program and improving promotion opportunities; and improvement of the openness and fairness of bidding.

Lithuania Concludes Agreement for Operation of 3,000-MWe Ignalina Station

The newly independent state of Lithuania has reached an agreement with the Soviet Union's Ministry of Atomic Energy and Industry for the Ministry to continue its responsibility for the operation, safety, fuel, and equipment for the Ignalina station in Lithuania. Lithuania formally took possession of the Ignalina station August 27, making the Lithuanian Ministry of Energy its new owner. However, the two Ignalina 1,500-MWe RMBKs (graphite-moderated, water-cooled reactors) will remain in the Soviet inventory under Soviet IAEA safeguards, until Lithuania can sign, ratify, and enact the conditions of the Treaty on the Nonproliferation of Nuclear Weapons.

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India Discovers Its Largest Uranium Deposit

India's Department of Atomic Energy announced the discovery of a major uranium deposit at Domiasat, south west of Shillong, in the state of Meghalaya. The sandstone-type deposit covers an area of more than ten square kilometers, ranging in depth from approximately 5 to 50 meters. Ore grades reach as high as 0.41 % U_3O_8. The department states this is India's largest and richest deposit yet discovered.

New York-LILCO Agreement Upheld by Highest NY Court

On October 22, the New York Court of Appeals, by a 4-3 decision, upheld the agreement between New York state and Long Island Lighting Co. (LILCO) that allowed LILCO to transfer ownership of the Shoreham nuclear plant to the Long Island Power Authority (LIPA) for the sum of $1.00. The agreement also allows LILCO to recover some of its $5 billion investment from ratepayers over an eleven-year period.

The 809-MWe (net) boiling water reactor was completed but never commercially operated due to public opposition. LILCO has requested, but not yet received, approval from the US Nuclear Regulatory Commission on a decommissioning plan; therefore LILCO, LIPA, and the New York Power Authority cannot yet proceed with full decommissioning efforts on the Shoreham plant.

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Yankee To Keep Rowe, Mass. Plant Shut Down Through April 1992 Refueling

Yankee Atomic Electric Company has decided to keep its 167-MWe pressurized-water reactor at Rowe, Massachusetts shut down through its planned refueling in April 1992, rather than petition the US Nuclear Regulatory Commission (NRC) to allow Yankee to resume operation at the plant before the scheduled refueling. Yankee will use the time to gather data on the embrittlement level of the pressure vessel, in the hopes of satisfying the NRC's concerns about the safety of the oldest operational US commercial reactor.

The NRC is most concerned about the reactor's ability to withstand pressurized thermal shock from the sudden rush of cold water introduced in an emergency cooling scenario. Yankee intends to present a substantial case to the NRC so that the Rowe unit is allowed to operate until the expiration of its license in 2000, and possibly to receive a license extension for operation until the year 2020. The amount of testing and evaluation necessary, as well as the preparation of the evidence for the NRC, may require Yankee to go beyond April 1992 before being allowed to restart. The embrittlement situation at the Rowe unit, and Yankee's and the NRC's handling of the issues is perceived as a test case for future operation and license extensions of many older US reactors.

Uruguay's Plans for 600-MWe CANDU Reactor on Hold

The government of Uruguay has put its plan for an Atomic Energy of Canada, Ltd. (AECL) 600-MWe CANDU-type pressurized, heavy-water reactor on indefinite hold until other energy alternatives can be examined. The government indicated that new energy alternatives have significantly altered its situation, since discussions were initiated with AECL. Paraguay is now offering to sell Uruguay electricity, and Brazil and Argentina are discussing the construction of a natural gas pipeline, which may give Uruguay access to a supply of natural gas.

Uruguay's three million people depend on hydroelectric power for nearly 75 percent of their electricity requirements, but recent droughts have severely hampered normal levels of electrical generation. A plan for a 600-MWe nuclear power plant was initiated with AECL, with Uruguay planning to export excess electricity to Brazil and Argentina.

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Japan Lifts Sanctions Against South Africa

Japan's government recently announced that it has lifted most trade sanctions against South Africa. Removal of these sanctions permits Japanese companies to again purchase South African uranium. Prior to 1988, when Japanese utilities complied with the sanctions, over 10 percent of Japan's uranium imports came from South Africa.

IAEA Gains New Members and Major Countries Agree to Full-Scope Safeguards

Yemen, and the newly independent states of Lithuania, Latvia, and Estonia have been accepted for membership in the International Atomic Energy Agency (IAEA). They still must confirm their membership by depositing instruments of membership with one of the agency's safe-keeping members.

In related matters, France, the United Kingdom, South Africa, and the Soviet Union all have announced they will apply IAEA full-scope safeguards to future agreements. However, prior agreements negotiated without full-scope safeguards, which require the recipient country to open all nuclear facilities to IAEA inspection, might not be changed. Nevertheless, parties to these prior contracts may be encouraged, thought not forced, to comply with full safeguards.

In addition, within the last year, Germany has applied the safeguards, and currently Belgium and Switzerland are considering applying them. China and North Korea now are even more conspicuous in their lack of full-scope IAEA safeguards. China's recent commitment to the sign the Treaty for the Non-Proliferation of Nuclear Weapons (NPT), makes it more likely that the country also would consider applying the safeguards. However, North Korea signed the NPT six years ago, but has not ratified the treaty and still operates non-safeguarded nuclear facilities.

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NUEXCO

ANALYSIS AND COMMENTARY

WORLD NUCLEAR GENERATING CAPACITY AND URANIUM REQUIREMENTS TO 2005

The following article summarizes sections of a NUEXCO study entitled Nuclear Fuel Market Analysis and Price Trend Projections, *pertaining to the world's installed nuclear electric generating capacity and consequent uranium requirements. Aggregated information is provided to give an overview of the world situation. Specific data for individual countries and reactors is published in the complete report and is available from NUEXCO Information Services.*

The outlook for the world nuclear power industry through 2005 is more positive than some may believe. Installed nuclear electric generating capacity is forecast to grow at an average rate of 2.4 percent per year, and reach 448 gigawatts electric (GWe) by 2005 (**Figure 1**, on the following page). Consequently, annual world uranium requirements also will grow, reaching over 200 million pounds equivalent U_3O_8 by 2005.

NUCLEAR GENERATING CAPACITY

All countries with announced nuclear power programs are included in the analysis, including the Soviet Union, all former east European countries, and China. **Table 1** below provides a list of all countries included in the analysis, grouped into the indicated regions. Countries not listed are not projected to have an operating nuclear plant before 2005.

To develop the capacity projections, the existing civilian nuclear power programs within each country were examined in reasonable detail. Numerous factors were considered for each country, including:

- Electricity demand growth rates.
- Political and societal environments.
- Financial resources of operating entities.
- National energy plans.
- National construction experience.
- Specific construction plans and schedules.
- Current status and construction progress.
- Construction management expertise.
- Licensing progress and/or backlog.
- Public acceptance of nuclear power.
- Projected plant lifetimes.
- Public utility regulatory considerations.

Table 1
COUNTRIES INCLUDED

Eastern Europe	Western Europe	Far East	United States	Other Countries
Bulgaria	Belgium	China [1]	USA	Argentina
CSFR [2]	France	Japan		Brazil
Finland	Germany	South Korea		Canada
Hungary	Italy	Taiwan		Cuba
Poland	The Netherlands			Egypt
Romania	Spain			India
Soviet Union	Sweden			Israel
Yugoslavia	Switzerland			Mexico
	UK			Pakistan
				South Africa

[1] China: refers to the People's Republic of China
[2] CSFR: Czech and Slovak Federal Republic, formerly Czechoslovakia

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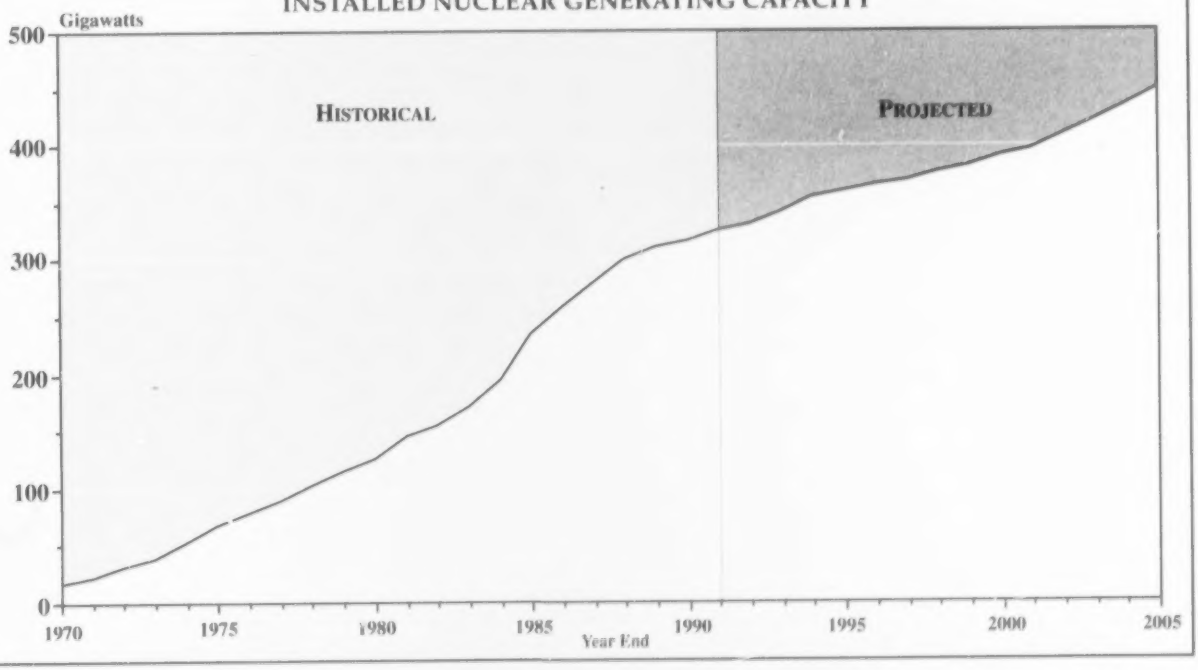
Figure 1
INSTALLED NUCLEAR GENERATING CAPACITY



The relative importance of these factors to the future development of nuclear power varies greatly from one country to another. For instance, in developing countries, financial resources are often the limiting consideration, whereas in highly developed countries, the rate of growth of total electricity demand is limiting. In many countries, nuclear growth is limited by political considerations.

In addition, several inherent uncertainties affect any long-term capacity projections. Some of these uncertainties include:

- The growth rate in demand for electricity. Recent rates of growth have exceeded many expert forecasts.
- Increased recognition by society at large that nuclear power is:
  - A low-risk power source.
  - A much lesser contributor to uncontained environmental pollution than alternate large sources of power (no CO_2-related greenhouse effect, ozone layer depletion, or acid rain problems).
  - A long-lasting source of low-cost energy.
- Substantial progress in the development of inherently safer nuclear power plants that are technically less demanding in construction and operation.
- Licensing reform adopted by the US Nuclear Regulatory Commission, including one-step licensing, site banking, and certification of standardized designs.

After evaluating all of this information, estimates were made for the most probable commercial operation date for reactors planned or under construction. These estimates, as well as estimates of future new units, decommissionings, and cancellations, were combined to produce the total installed nuclear capacity projections.

All projections in the study were made for low growth, high growth, and reference case scenarios. This article summarizes only the reference case. That scenario assumes some slippage of construction progress from announced schedules of reactors under construction, and also assumes that most reactors whose construction has been halted will eventually be cancelled.

As mentioned at the beginning of the article, installed

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nuclear capacity will reach 448 GWe by 2005, growing at an average rate of 2.4 percent per year. As shown in **Figure 2**, the large majority of this capacity is already operating (314 GWe); 73 GWe of capacity is under construction; 29 GWe is planned; and an additional 43 GWe is estimated to be constructed and operational by 2005.

Figure 3 is a bar chart showing net annual additions to installed capacity from 1970 through 1990, and projected through 2005. This figure vividly shows the reduced growth rate of new capacity compared with historical annual additions. The average net annual addition from 1976 through 1990 were 16.5 GWe, and the projected average net annual additions from 1991 to 2005 are 8.9 GWe.

Although growth has slowed from the 1970s and 1980s, particularly in the USA and western Europe, the growth rate in eastern Europe, Asia, and other countries is expected to remain significant. **Table 2** shows the current and projected capacity by region and the respective growth rates through the year 2000.

Reactor Type Projections

As installed capacity grows worldwide, uranium requirements also will grow, but will be affected by the requirement characteristics of the different types of reactors. **Figure 4** shows the historic and projected composition of the world's nuclear capacity by reactor type. The graph indicates that the Boiling Water Reactor (BWR) proportion stays fairly constant in the 1990s, at about 22 percent.

Figure 2
INSTALLED NUCLEAR GENERATING CAPACITY BY CURRENT STATUS

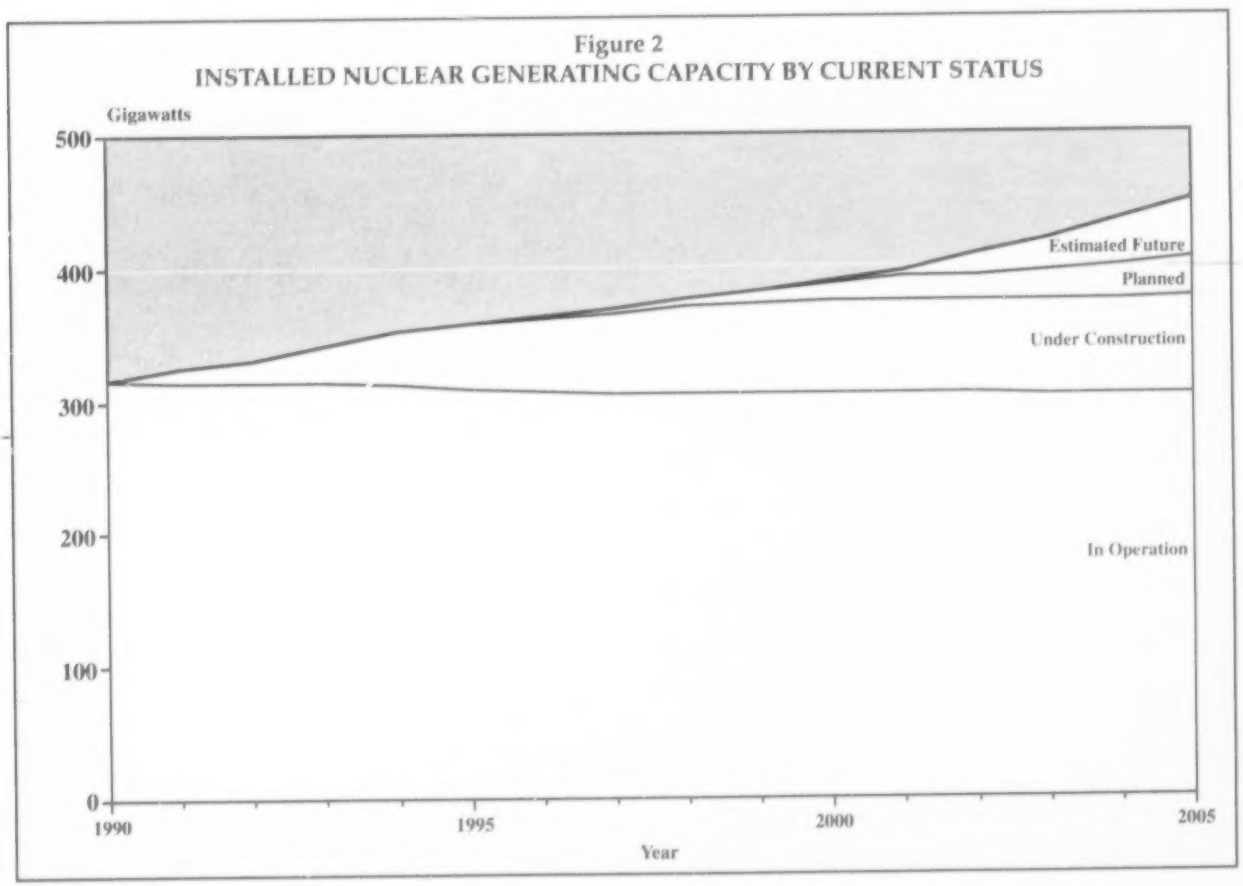

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Figure 3
NUCLEAR GENERATING CAPACITY — NET ANNUAL ADDITIONS

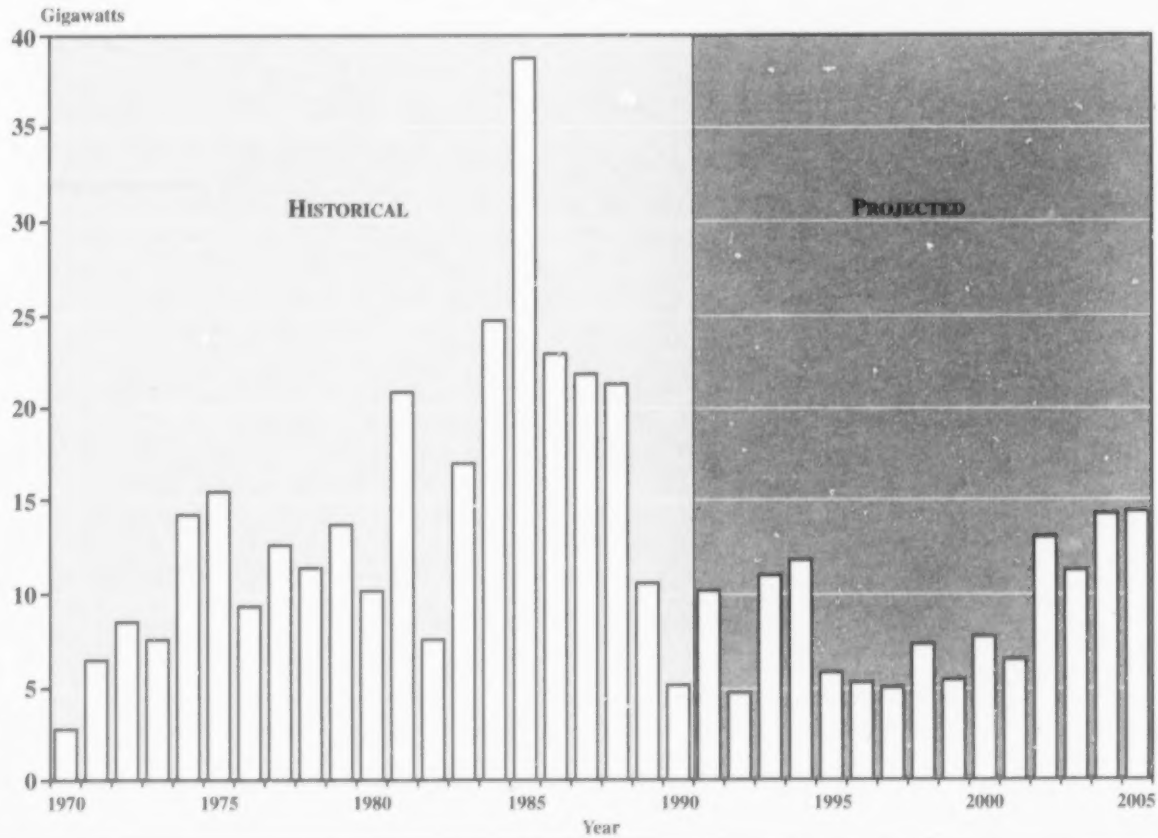

Table 2
EXPECTED GROWTH IN CAPACITY OF NUCLEAR POWER

Region	Capacity GWe		Growth (end of 1990 to end of 2000)		
	1990	2000	GWe	Percent	Percent/Year
Eastern Europe	42.9	69.9	27.0	63	4.9
Western Europe	111.8	126.3	14.5	13	1.2
Far East	42.4	63.5	21.1	50	4.0
United States	99.3	102.8	3.5	4	0.3
Other Countries	18.6	26.2	7.6	41	3.4
Total World	**315.0**	**388.7**	**73.7**	**23.4**	**2.1**

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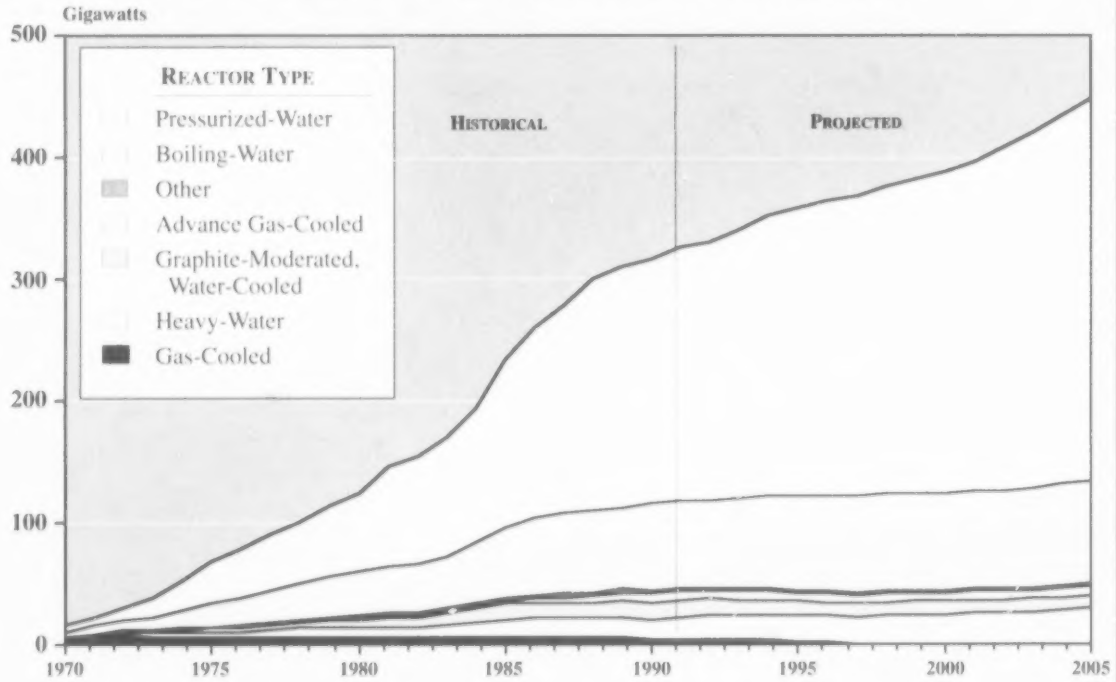
Figure 4
INSTALLED NUCLEAR GENERATING CAPACITY BY REACTOR TYPE



The Gas Cooled Reactor (GCR) share was 3 percent in 1970 and gradually drops out by 1999; the Heavy Water Reactor (HWR) remains fairly steady at about 6 percent; the Advanced Gas Reactor (AGR) emerged in the mid-1970s and remains at a very small share (2 percent). The Pressurized Water Reactor (PWR) carries the largest share of all, rising from 3 percent in the early 1970s, to about 70 percent through 2005.

Capacity Factors

Another significant factor that directly affects projected world uranium requirements is the capacity factor of each reactor worldwide. Reactor capacity factor (CF) is defined as the ratio of actual electric production over a period of time, to the theoretical maximum production that could have been obtained had the reactor operated at full power 100 percent of the time. Plant-by-plant capacity factors throughout the world were compiled and analyzed. The individual reactor capacity factors were processed to yield an average capacity factor for that reactor for the last three years: 1988, 1989, and 1990. These averages were used as the projected capacity factor in 1991 for that reactor. Capacity factors for Bulgaria, CSFR, and the Soviet Union were based on a two-year average of 1988 and 1989.

In order to allow for reasonable future improvements in plant operating reliability, the capacity factor of each reactor is assumed to increase each year as a ramp function toward a maximum feasible capacity factor for that reactor type. This improvement function depends upon the specific characteristics of the reactor, such as whether it refuels on-line or shuts down for refueling. The function also allows for greater increases

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from reactors that have lower average CF's, and smaller increases from high CF plants, to reflect that each incremental improvement in capacity factor becomes more difficult as a plant approaches a maximum feasible capacity factor. **Figure 5** shows the historical and projected average world capacity factor. Projected capacity factors by region for 1991 and 2001 are provided in **Table 3**. These figures are aggregated from a reactor-by-reactor analysis.

Electricity Production

After incorporating all of the different factors to determine nuclear generating capacity, total world electricity production is projected to total 35,500 terawatt hours. **Figure 6** shows the projected cumulative production share by region for 1991 through 2005.

URANIUM REQUIREMENTS

Using the projections for installed nuclear generating capacity and specific reactor capacity factors, as well as calculations of optimal tails assays and fuel burnups, yields projections of world uranium requirements. Compared to previous NUEXCO studies, the projected requirements for fuel materials and services are slightly lower than last year's analysis. This drop is a result of further enhancements made in the calculation model to better reflect changing fuel design burnups and relative enrichment requirements.

Figure 5
HISTORICAL AND PROJECTED NUCLEAR PLANT CAPACITY FACTOR
(Maximum Dependable Capacity Basis)

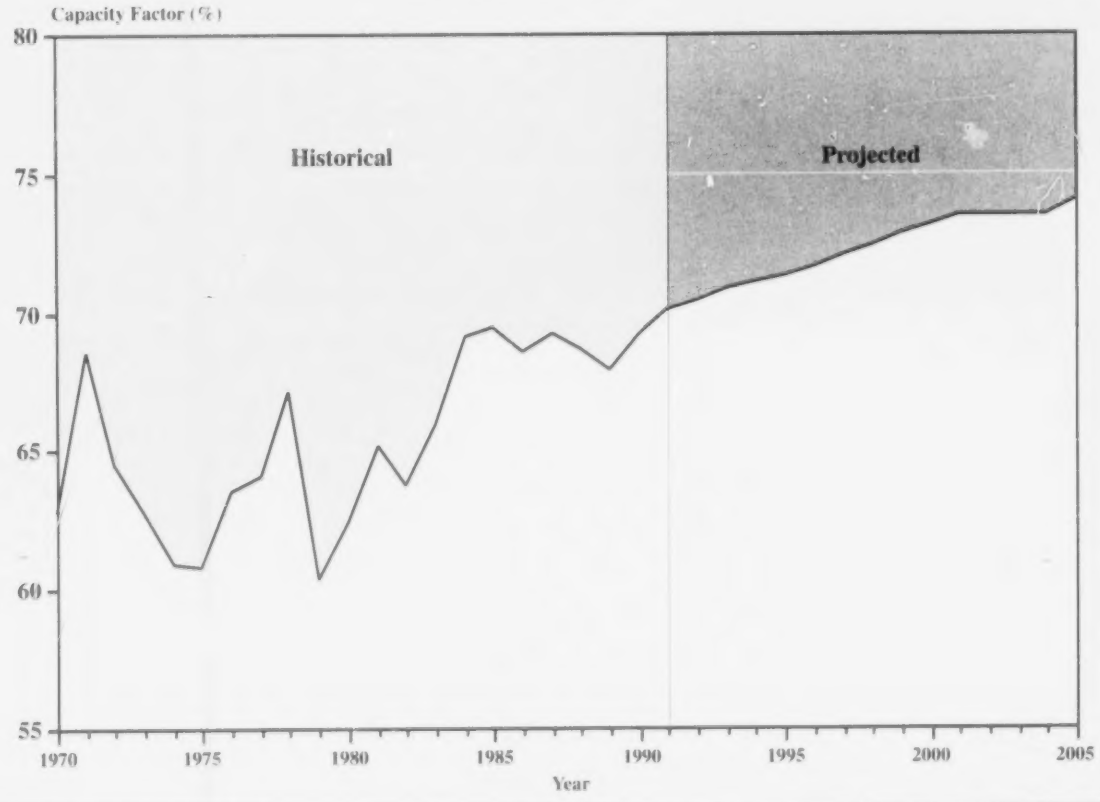

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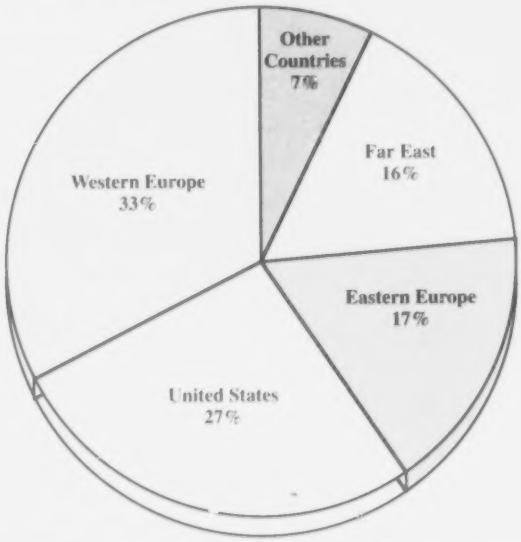
Figure 6
PROJECTED CUMULATIVE NUCLEAR ELECTRIC PRODUCTION BY REGION — 1991 through 2005



The principal factors affecting uranium requirements include:

- Nuclear electric generating capacity in operation, and annual additions.
- Nuclear plant design characteristics:
  - Operating life
  - Core loading
  - Thermal efficiency
- Nuclear plant operating characteristics:
  - Capacity factor
  - Cycle length
- Nuclear fuel characteristics:
  - Fuel assembly design
  - Initial core enrichment and burnup
  - Reload fuel enrichment and burnup
- Fuel cycle characteristics:
  - Enrichment tails assay
  - Recycle of uranium
  - Recycle of plutonium
  - Fuel preparation lead times
  - Fuel processing losses

Table 3
PROJECTED CAPACITY FACTOR BY REGION

Region	Capacity Factor (%) 1991	2001
Eastern Europe	73.0	74.6
Western Europe	69.4	72.7
Far East	73.0	75.6
United States	68.5	72.7
Other Countires	69.2	71.2
WORLD	**70.1**	**73.4**

The uranium requirements calculations include an optimization for enrichment tails assay. The enrichment tails assay in each year is selected so as to minimize the cost of enriched uranium product based on the projected spot price of uranium and the estimated price of enrichment services. In this analysis, the optimization yielded a tails assay in excess of 0.3 weight-percent U^{235} in almost all years. The nominal maximum tails assay allowed by most enrichers is 0.3 weight-percent. Therefore, in keeping with this constraint, a tails assay of 0.3 weight-percent was used consistently in the calculations of requirements.

After considering all of the factors, world requirements are estimated at 150 million pounds U_3O_8 in 1991, 173 million pounds U_3O_8 in 2000, and 205 million in 2005. These are the total requirements, excluding any reductions attributable to current inventory usage or recycling programs. Any excess inventory usage and recovered products from reprocessing are treated as supplementary feed. The projection shows an average annual growth in uranium requirements of 2.2 percent from 1991 through 2005, which is equivalent to about 3.9 million pounds U_3O_8 per year. **Figure 7** shows projected relative uranium requirements for the world. As can be seen in that figure, five countries constitute about 73 percent of the total natural uranium requirements: United States, Soviet Union, France, Japan, and Germany.

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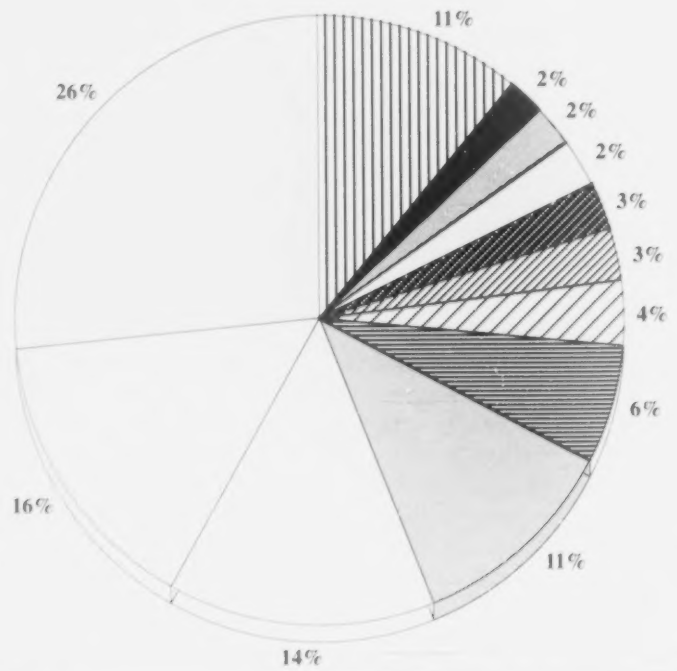
Figure 7
PROJECTED CUMULATIVE NUCLEAR ELECTRIC PRODUCTION BY COUNTRY — 1991 through 2005



Japan	UK	Other
France	South Korea	Spain
Soviet Union	Canada	CSFR
USA	Germany	Sweden

Table 4 lists the projected annual uranium requirements of the world by region for 1991 and 2000. These data show a 5.6 percent annual growth in uranium requirements for Other Countries, 3.0 percent for Eastern Europe, 1.8 percent for the Far East, and only 0.9 percent and 0.3 percent respectively, for Western Europe and the USA, giving 1.6 percent overall for the world. Note that the projection shown is through the year 2000. This reflects the higher degree of accuracy through that time frame, as reactors that come on line by that time likely are already under construction, and therefore completion schedules and expected requirements can be more accurately forecast.

Although nuclear power may not be growing as fast as it was in the 1970s, the outlook for the industry is positive, as growth worldwide continues to provide opportunities. Increased awareness by the public of both the monetary and environmental costs of fossil fuel plants, along with improved reactor designs, suggest that the growth will continue.

Table 4
NATURAL URANIUM REQUIREMENTS

Region	Requirement		Growth (1991 to 2000)		
	Million lbs. equivalent U_3O_8		Million lbs U_3O_8	Percent	Percent/Year
	1991	2000			
Eastern Europe	29.7	38.9	9.2	31	3.0
Western Europe	46.3	50.3	4.1	9	0.9
Far East	23.3	27.4	4.1	18	1.8
United States	43.5	44.9	1.4	3	0.3
Other Countries	7.0	11.6	4.5	65	5.6
Total World	**149.7**	**173.0**	**23.3**	**16**	**1.6**

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HUNGARY:
MEETING ELECTRICITY NEEDS WITH NUCLEAR POWER

BACKGROUND

Following Poland, Hungary was the second east European country to embrace democracy and adopt major reforms. On March 25, 1990, Hungary held its first free national elections in over 40 years. The country has experimented with free market concepts for a number of years, and its new government favors rapid economic integration with western Europe. Hungary has one of the strongest industrial bases in all of eastern Europe, and industrial output accounts for over 50 percent of the country's gross domestic product. However, inefficient use of energy throughout all sectors of the country has made Hungary dependent on energy imports.

This reliance on energy imports makes the role of nuclear power even more important in Hungary. The government has recognized the importance of improving the efficiency of its energy use and reducing its dependency on energy imports, and is carefully examining nuclear power as a means to achieve that goal. Hungary's nuclear power station at Paks already accounts for about half the country's total domestic electricity generation.

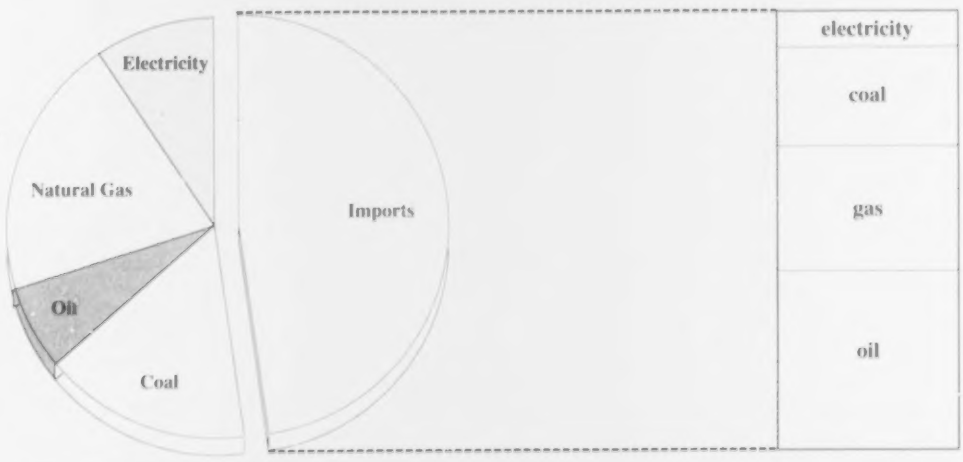
Hungary also faces enormous economic challenges, including high foreign debt, high inflation, lagging wage increases, and rising unemployment. Nevertheless, the country's industrial base, the government's firm commitment to democracy, and previous experiments with market reforms make Hungary better situated than other former East Bloc countries to make the difficult transition to a market economy.

ENERGY SITUATION

Hungary's energy situation is comparable to the overall condition of the entire country, in that it has a number of assets but some challenges as well. The two major energy challenges facing Hungary are an inefficient use of energy and a dependency on energy imports.

Hungary's limited natural resources have caused the country to become economically dependent on foreign trade and to import nearly 50 percent of its energy (**Figure 1**). While Hungary is not overly dependent on any one source of energy, it is compelled to import all types of energy,

Figure 1
HUNGARY'S ENERGY CONSUMPTION



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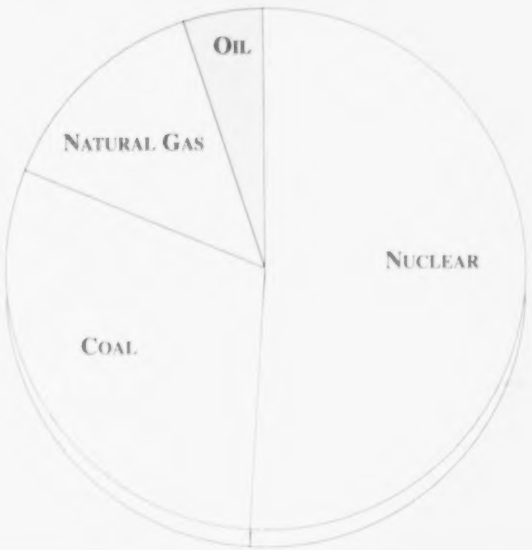
including coal, oil, gas, and electricity. Over 95 percent of Hungary's energy imports come from the Soviet Union, but this presents another challenge. Due to the Soviet Union's own energy problems, it has announced plans to reduce its exports by 30 percent or more in upcoming years. To prevent a shortfall of energy imports for 1992, Hungary already has signed a contract with the Soviet Union to pay hard currency for 4 to 5 million metric tons of oil, 6 to 6.5 billion cubic meters of natural gas, and 8 million MWh of electricity. These imports should satisfy most of Hungary's needs for the upcoming year.

To improve its domestic supply in the near term, Hungary's power plants have been upgraded with new boilers or turbogenerators to improve their efficiency. As a result, many plants now are operating at nameplate capacity, instead of being downrated by 20 to 30 percent, or more. For the long term, additional generating plants are planned.

While Hungary's strong industrial base is an asset, most of its industries are very energy intensive, such as the steel industry. Thus far, the government's efforts to improve the efficiency of existing industries have proven successful, as the industrial sector currently consumes 10 percent less energy than only a few years ago. But even with additional gains in efficiency, overall energy demand is projected to grow at a *net* rate of 1.0 to 1.5 percent per year during the 1990s, with a large portion projected as growth in electricity demand.

Figure 2
1990 DOMESTIC ELECTRICITY GENERATION SHARE BY SOURCE



ELECTRICITY

Electricity consumption currently accounts for 12 to 13 percent of total energy demand in Hungary. The country's most important source of electricity is nuclear power, accounting for just over 50 percent of all domestic electricity generation (**Figure 2**). Coal is the next most important source, fueling about one-third of the country's domestic electricity generation. But due to low-grade domestic reserves, much of Hungary's coal must be imported.

Total net energy growth is expected to remain at modest levels, but demand for electricity is expected to grow much

Table 1
HUNGARY'S MAJOR POWER STATIONS

Power Station	Fuel	Station capacity (MWe)	1989 electrical generation (GWh)
Ajka	coal	112	818
Borsod	coal	172	870
Budapest	oil and gas	131	645
Dunamenti	oil and gas	1,870	3,245
Gegarin	lignite	800	2,769
November 7	coal	100	237
November 7	gas	170	9
Oroszlány	coal	235	1,195
Paks	nuclear	1,710	13,891
Pécs	coal	228	892
Bánhide	coal	100	492
Tiezapalkonya	coal	255	1,283
Tieza IL	oil and gas	860	1,975
Total		**6,743**	**28,321**

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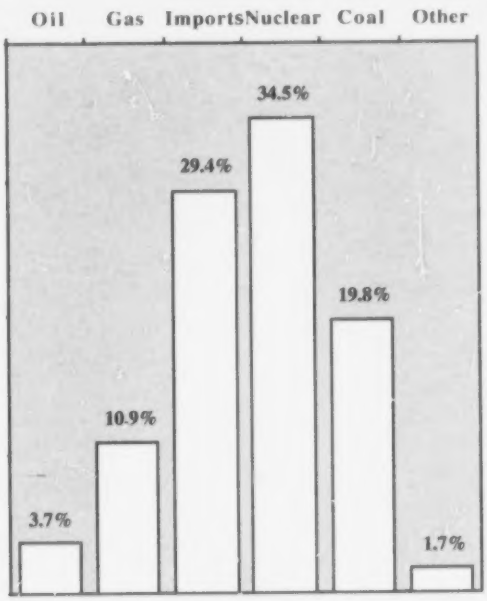
Figure 3
TOTAL ELECTRICAL SUPPLY BY SOURCE



more rapidly, as Hungary's market reforms improve the economy. Forecasts indicate electrical demand will climb to 48 million GWh by 2005—a 33-percent increase from 1988 levels. That translates to an additional 5,000 MWe of capacity. This additional capacity takes on greater significance when compared to Hungary's existing electrical generating capacity, which totals less than 7,000 MWe. **Table 1** lists the major power stations in Hungary and their generating capacities.

As shown in **Figure 3**, the majority of Hungary's electricity supply is either nuclear-generated or imported. The associated **Figure 4** shows how the industrial sector consumes the greatest share of the total. Through improved efficiencies, industry's share is declining, but this sector remains the focal point of the government's conservation programs.

As the transition toward a market economy creates the need for new capacity, the freedoms of democracy also can bring new challenges. For example, an 890-MWe hydroelectric project on the border between Hungary and the Czech and Slovak Federal Republic, known as the Nagymaros project, was initiated in 1977. But by 1989, this project was stopped by environmental opposition, and was later abandoned. Hungary's 430-MWe share of the potential power generation from Nagymaros is sorely missed.

Figure 4
ELECTRICAL CONSUMPTION BY SECTOR

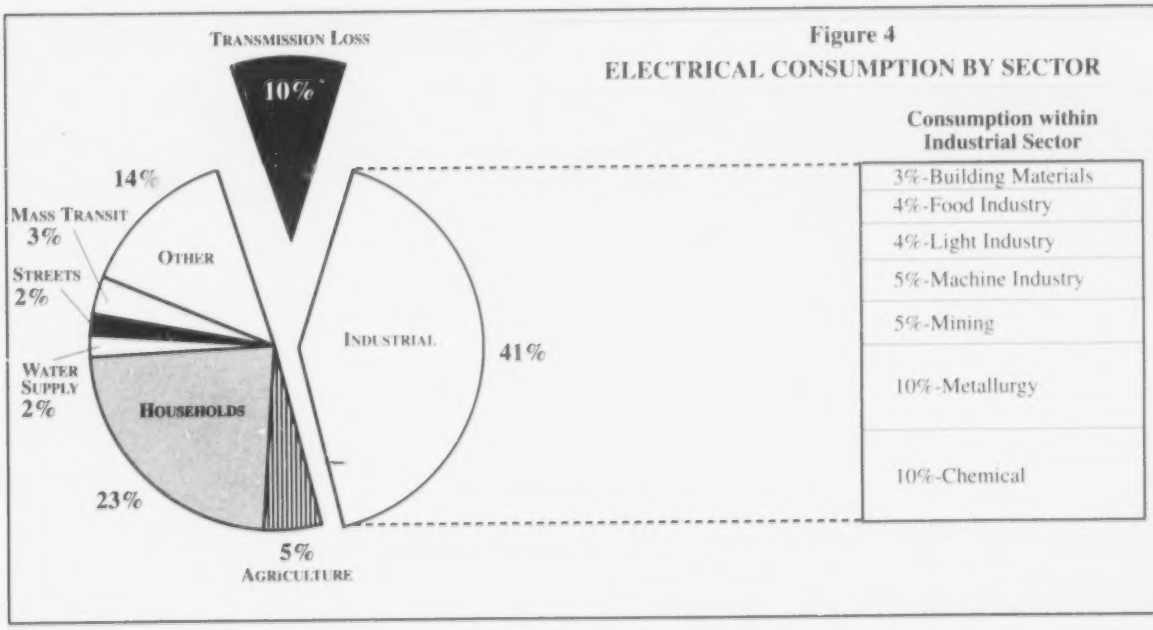


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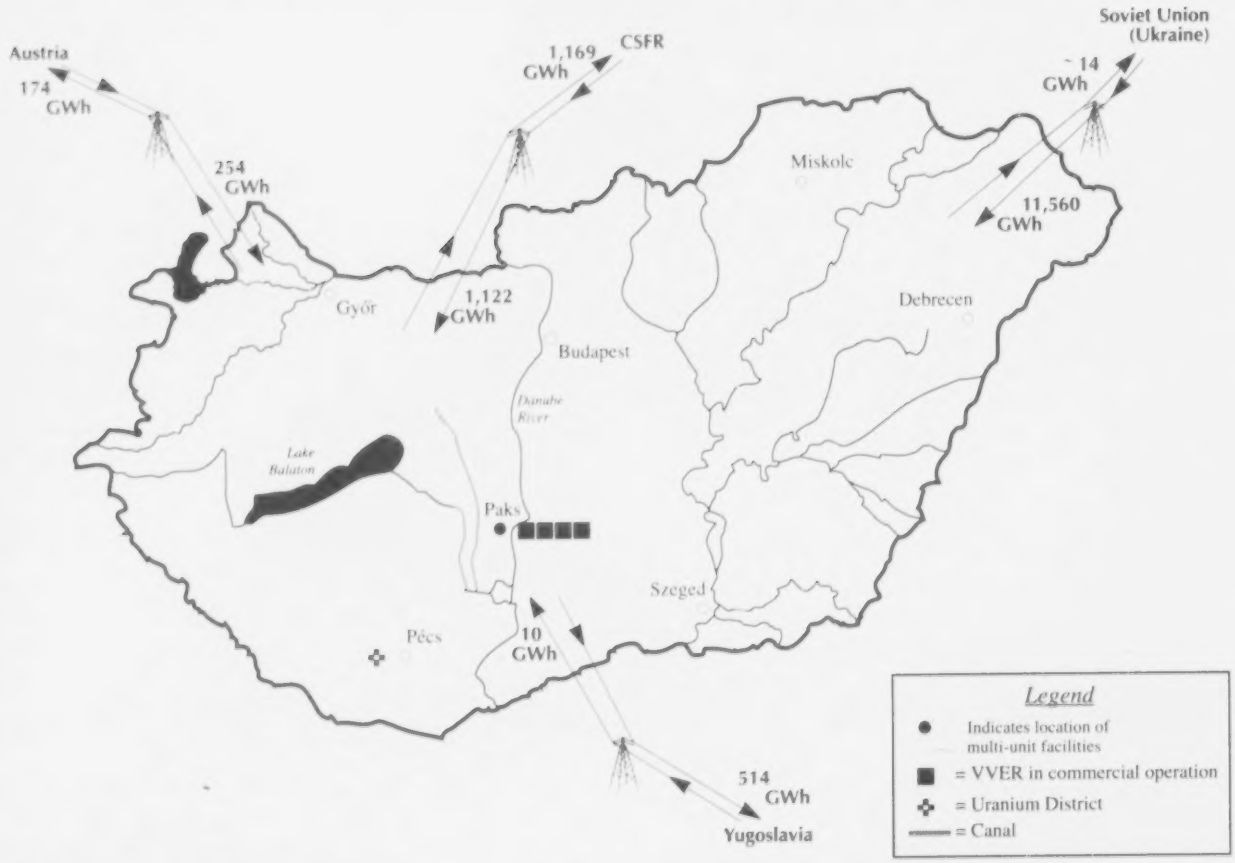
Figure 5
HUNGARY'S FUEL CYCLE FACILITIES AND ELECTRICITY IMPORTS/EXPORTS



Furthermore, Hungary now is committed to supply power to Austria, which helped Hungary finance the Nagymaros project. Hungary intends to fulfill the contract, but has not yet determined where it will get the power.

In an effort to cut demand, the government recently raised electricity prices by over 44 percent. Since it also is committed to eliminating price subsidies on electricity, even greater price increases are likely in the future. The US Agency for International Development recently granted US$10 million in aid to help Hungarians adjust to the higher electricity bills, and to encourage further price reforms.

Imports/Exports

Hungary is dependent upon imports for about 30 percent of its total electricity supply. The map in **Figure 5** illustrates the turnover of electricity in Hungary. By far the largest volume of imports come from the Soviet Union, providing almost 12 thousand GWh in 1989. Most of this power comes from the Ukraine from power plants built jointly with the Hungarians. While Hungary both imports power from and exports power to the Soviet Union, Austria, the Czech and Slovak Federal Republic (CSFR), and Yugoslavia, net imports exceed 11 thousand GWh.

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Hungary plans to be connected to western Europe's electricity grid by 1993 or 1994, both to provide near-term access to a diversity of electricity supplies for import, and for the long term, to provide a means of exporting electricity for revenue. EdF's president, Pierre Delaporte, in a 1990 interview (see NUEXCO Monthly Report #262, June 1990, p. 31) compared Hungary to Switzerland, saying that Hungary was geographically in an excellent position to become a central point of a unified European electricity grid. M. Delaporte stated that a new power plant project in Hungary "would have major geopolitical significance, because there no longer would be just a few transmission lines, but a major bridge between East and West..."

Given Hungary's dependence on energy imports, it is likely the government will elect to install some new capacity before the end of the decade. Forecasts project about 1,300 MWe of gas-fired capacity will be added by 2005, but that still leaves unidentified the source of several thousand megawatts of needed capacity. The government has examined many options, but has not yet decided when to install new plants or if they should be nuclear- or fossil-fueled. A decision on plans for new capacity is expected in 1992.

NUCLEAR POWER PROGRAM

Like the nuclear power programs of other former COMECON countries, Hungary's program was begun in the 1970s in cooperation with the Soviet Union. The Hungarian Electricity Board (Magyar Villamos Müvek Tröszt) oversees all of the country's power plants, including Paks; the station is operated by the state-owned utility, Paksi Atomerőmű Vállatat (PAV). Currently, four reactors are operating at the station, each a 440-MWe (gross) VVER (**Table 2**). The Paks station accounts for only about one quarter of Hungary's total installed electric capacity, but generated 51 percent of all domestically produced electricity in 1990. That percent contribution to total generation is among the highest in the world,

Table 2
NUCLEAR POWER UNITS IN HUNGARY

Units In Operation

Unit	Lead Utility or Fuel Buyer	Capacity (MWe Net)	Type	COD[1]	1990 Capacity Factor (percent)	Total 1990 Electricity Generation (GWh net)
Paks 1	MVMT[2]	415	VVER	1983	88.5	3,217
Paks 2	MVMT	425	VVER	1984	89.7	3,338
Paks 3	MVMT	435	VVER	1986	85.9	3,273
Paks 4	MVMT	435	VVER	1987	80.4	3,065
Total		**1,710**		*(1990 Average:*	**86.1)**	**12,893**

Units Planned[3]

Unit	Lead Utility or Fuel Buyer	Capacity (MWe Net)	Type	COD[1]	Percent Complete
Paks 5	MVMT	900	PWR	2000	planned
Paks 6	MVMT	900	PWR	2002	planned
Total		**1,800**			

[1] COD = Commercial Operation Date (actual or expected)
[2] MVMT = Magyar Villamos Müvek Tröszt (Hungarian Electricity Board)
[3] The two units planned are PWRs to be built with the assistance of an EdF-led consortium. However, no final selection has yet been made, and a proposal for CANDU HWR units built with Canadian assistance is also under consideration, as well as proposals from several other groups.

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lagging only France (75%) and Belgium (60%), and comparable to South Korea (49%). The Paks station performs extraordinarily well, and units 2 and 4 are consistently listed among the top ten reactors in the world when judged on load factor. The entire station has a remarkable lifetime capacity factor exceeding 86 percent.

The original contract for Paks was signed in 1966 and the preliminary construction began in 1968, but was stopped two years later because oil-fired stations were more economical. After the oil crisis of the mid-1970s, construction at the Paks station resumed. This delay actually was fortuitous, for during those years a second-generation VVER was developed (Model 213). This is an important distinction, as first-generation units (Model 230) do not meet current safety standards. First-generation plants at Greifswald in the former East Germany have been shut down permanently, and Bulgaria's Model 230s have been scrutinized by the international community and identified with a number of safety deficiencies. The second-generation VVERs at Paks include containment features, and independent and redundant core cooling systems similar to Western-designed reactors, features that enable the reactors to be upgraded successfully to meet higher safety standards.

PAV brought its first reactor at the Paks station into commercial operation in 1983. Successive reactors were brought into operation in 1984, 1986, and 1987. All of the Paks reactors run on twelve-month cycles, typically shutting down sometime each summer for maintenance and for refueling one-third of the core.

Future Plans

A majority of Hungarians prefer nuclear power because of its excellent operating record in Hungary and because of the severe pollution problems caused by outmoded fossil fuel plants. While some anti-nuclear opposition is emerging, it is not as strong as in other east European countries, even though the Chernobyl accident occurred not far from Hungary's borders. With the country's projected demand growth, two more reactors were planned for the Paks station, each a 1,000-MWe VVER from the Soviet Union; however those plans were cancelled in late 1990 because the government wished to examine other alternatives.

Hungary now has begun anew by soliciting offers worldwide for new plant capacity. Negotiations appear to be most active with a consortium led by Electricité de France (EdF) and PREAG of Germany, which has offered to supply two 900-MWe Pressurized Water Reactors (PWR) of French-German technology. The consortium would provide about 70 percent of the financing, and electricity exports, equivalent to half the plants' production, would be used to repay this construction loan.

Another alternative under serious consideration is an offer from Atomic Energy of Canada, Ltd. (AECL) and Ontario Hydro to supply four, 450-MWe CANDU reactors. The Canadian government, AECL, and Ontario Hydro have been working closely with the Hungarians for over a year. The Canadian government already has indicated it likely would approve loans to Hungary for funding this project. Several other offers have also been received, including a proposal from Switzerland's ABB Atom, a joint proposal from Finland's Imatron Voima Oy (IVO) and Atomenergoexport of the Soviet Union, and an offer from a consortium of Westinghouse (USA), Bechtel (USA), Ansaldo (Italy), and INITEC, ENSA, and ENUSA (Spain).

Regardless of the type of plant or reactor supplier selected, Hungary's limited supply of hard currency will require financing the plants' construction through loans from the supplier, with repayment in the form of electricity exports.

In other nuclear-related developments, Hungary formed the Hungarian Nuclear Society near the end of 1990. The Hungarian government also signed a cooperation agreement with the USA on the safe and peaceful uses of nuclear power. The agreement will make it easier for US nuclear vendors to supply nuclear equipment, technology, and technical support to Hungary.

Internally, Hungary has restructured its governmental regulation of nuclear power. The country's Atomic Energy Commission (AEC) became an independent body effective January 1, 1991. The AEC is the country's nuclear regulatory agency and formerly had been supervised by the Ministry of Industry and Trade, which also supervised operations at the Paks station. Granting the Commission autonomy is a positive move, allowing more objective reviews and critiques of performance at Paks. These reviews, combined with current safety improvement programs from the International Atomic Energy Agency and the World Association of Nuclear Operators, and with the experience gained at IVO's VVERs in Finland, are helping safety efforts at Paks to rise quickly to international standards.

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Fuel Supply

Like other east European countries, Hungary had purchased all its fuel cycle services from the Soviet Union under bilateral trade agreements. With the breakdown of those agreements, PAV in Hungary, like utilities in the CSFR and Bulgaria, renegotiated their fuel supply contracts with the Soviet Union in 1990.

Until January 1991, PAV purchased all its fuel, including its natural uranium, from the Soviet Union. When in late 1990, the Soviets stopped purchasing uranium produced from Hungary's sole uranium mine, the Hungarian government directed PAV to purchase its uranium feed domestically. As a result, new contracts were negotiated allowing PAV to buy its U_3O_8 from a Hungarian source, and to purchase its conversion, enrichment, fabrication, and back-end fuel cycle services from the Soviet Union at competitive prices.

The contract signed earlier this year with Atomenergoexport (AEE), covers the fabricated fuel requirements for all four units for the entire operational life of the Paks station. The terms also contain a provision by which AEE will take the spent fuel from Paks. Competing Western fuel supply offers to Paks did not offer any such provision. Unlike past arrangements, payment for the services will be negotiated annually and must be made in hard currency.

URANIUM RESOURCES AND PRODUCTION

Only one exploitable uranium deposit exists in Hungary. The Pécs uranium project is located in the southern part of the country on the western flank of the Mecsek Mountains (**Figure 5**). It lies 15 to 18 km west of the city of Pécs. The deposit was discovered in 1952 by a Hungarian-Soviet uranium exploration joint-venture. Mine development began shortly after the deposit was confirmed, and production began in 1956. The mining project is operated by the Mecsek Ore Mining Company, a state-owned organization. In recent years, as many as 8,000 people were employed at the project and in other support areas, although production cutbacks and layoffs have reduced that number by at least half.

In 1990, the Hungarian government decided to shut down the mine by 1992 because of uneconomical operating costs. However, earlier this year, the government reversed its decision and agreed to continue to subsidize production, because the costs of subsidies were substantially less than the cost of worker retraining, unemployment compensation, and decommissioning of the site. Production is expected to continue at least through 1994.

Mineralization

Ore mineralization at Pécs is lenticular and occurs in permian sandstone. The thickness of the formation containing the productive lenses ranges from 10 to 50 meters. Size of lenses range from a few hundred tons to tens of thousands of tons. Similarly, the thickness of the orebodies also varies widely, ranging from 0.5 to 5 meters. The ore grade of the original reserves averaged 0.2 weight-percent (%) U_3O_8, but showed substantial variation within individual lenses.

Reserves

Between 1956 and 1990, 49 million pounds U_3O_8 were produced from the Pécs project at an average grade of 0.08% U_3O_8. Remaining reasonably assured resources (RAR) total 5.6 million pounds U_3O_8, with an average grade of 0.125% U_3O_8. Estimated additional resources exceed 28 million pounds U_3O_8 at 0.116% U_3O_8. Economically, only about 4 million pounds U_3O_8 of the RAR is recoverable at less than $30 per pound U_3O_8.

Production

Uranium ore is mined by conventional underground methods using a series of shafts at intervals along the strike of the orebody. Each of these shafts is operated individually as a mine unit. Shaft depth has reached 1,100 meters; average operational depth is 600 to 650 meters. Mining progresses downward, employing the methods of room-and-pillar and open stoping.

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Ore is defined radiometrically, then blasted and hauled to the surface by an underground railway system to a central dumping location. Trucks then deliver the ore to the processing plant (mill) at the southern flank of the mining area, approximately 1.5 km away.

All ore from the deposit is fully processed in the company's own mill that began operation 25 years ago. The mill uses radiometric sorting followed by hydrometallurgy, and produces $Ca(U_2O_7)$. Production has ranged from 1.0 million pounds U_3O_8 per year to a peak of 1.8 million pounds, recently averaging about 1.3 million pounds annually.

One to two percent of production comes from surface heap leaching using sodium carbonate solution, as opposed to sulfuric acid hydrometallurgy. Low-grade ore and the rock rejected from radiometric sorting are treated together by this method.

Uranium Marketing

Through 1990, Mecsek sold all production from the Pécs project to the Soviet Union under a bilateral trade agreement. This contract with the Soviet Union was a U_3O_8 supply contract unrelated to any fuel cycle services contract between PAV and the Soviet Union to fuel the Paks station.

In 1990, the Soviet Union indicated it no longer would purchase Hungary's uranium. With the loss of its only customer, Mecsek had few alternatives. The first was to shut down and leave thousands of people unemployed. Another option was to export; however, the market price of uranium was below production cost. The Hungarian government decided that the third option—to sell Mecsek's uranium to PAV—was the most feasible. Consequently, the state's nuclear utility began to purchase all of its uranium feed from Mecsek. PAV then renegotiated its contract with the Soviet Union allowing the utility to provide Hungarian U_3O_8 as feed.

Since PAV is not obligated to continue purchasing Mecsek's uranium, the mining company now is working to improve its efficiency and reduce its production costs, so it can remain a supplier to PAV and also become competitive in the world uranium market. To accomplish this goal, in 1990 Mecsek began negotiating a joint venture with Glencar Exploration plc. of Ireland, in which Glencar would first provide technical assistance to Mecsek, and later begin managing the Pécs operation.

Company Structure

Mecsek's company structure consists of several units, including the head office; mines 3, 4, and 5 (mines 1 and 2 are depleted); the processing plant (mill); and storage facilities. In addition, Mecsek is involved in numerous other activities, including:

- Geological, hydrogeological, and geophysical surveying and mapping.
- Deep drilling for ore, water, and geological structure exploration.
- Steel and steel alloy foundry.
- Manufacturing of rubber and rubber-coated products.
- Manufacturing of split rock bolts.
- Mixing of ammonium nitrate-fuel oil blasting materials.

The company also has its own heating, water supply, and pneumatic plants.

SPENT FUEL STORAGE

At this time, spent fuel from the Paks station is returned to the Soviet Union for storage and disposal. However, the uncertainty of how long the Soviet Union or the Republic of Russia will continue to accept spent fuel has led Hungary to examine interim spent fuel storage options. For example, the EdF-led consortium's offer to build two PWRs at the Paks station includes allowances for taking back spent fuel. Canada has already sent experts to Hungary and is examining the feasibility of a potential waste storage site below the Pécs uranium mine once it is shut down. Preliminary studies have indicated that a site below the Pécs mine could be geologically sound for a repository. The Hungarian government is expected to solicit offers on dry storage technology and site proposals from Western vendors by year end.

CONCLUSION

As Hungary's economy and energy needs begin to expand, nuclear power will play an important role. The country's experience and high degree of success with its nuclear program have established nuclear power as a viable option to reduce the country's dependency on energy imports and to provide capacity to meet future demand.

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NUCLEAR INDUSTRY CALENDAR

1991

Dec. 2-4 ***PLEX '91 BERLIN – Nuclear Plant Life Extension, Upgrading, Repair, Refurbishment, Uprating and Ageing***
(Hotel Steigenberger, Berlin, Germany). Sponsored by Nuclear Engineering International.
Contact: Conference (PLEX); Status Meetings Ltd., Festival Hall, Petersfield, Hampshire, GU31 4JW, UK;
Phone: 44-730-66544; Fax: 44-730-68865; Telex: 86105 CONFER G.

1992

Feb. 23-25 ***INFO Centers Workshop*** (Marriott Hotel, Palm Beach Gardens, Florida).
Sponsored by the U. S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

March 22-25 ***Fuel Cycle Conference '92*** (OMNI Charleston Hotel, Charleston, South Carolina).
Sponsored by the U. S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

April 12-16 ***8th Pacific Basin Conference*** (Taipei, Taiwan).
Sponsored by the Amercian Nuclear Society.
Contact: ANS Meetings Department; 708-352-6611.

April 26-28 ***INFO '92 Conference*** (OMNI Charlotte Hotel, Charlotte, North Carolina).
Sponsored by the U. S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

May 5-7 ***Annual Meeting on Nuclear Technology '92*** (City Conference Hall, Karlsruhe, Germany).
Sponsored by the German Nuclear Society and the German Atomic Forum.
Contact: Congress Office JK'92; INFORUM GmbH, Heussallee 10, W-5300 Bonn 1; Phone: 0228-507-223.

Sept. 20-23 ***International Uranium Seminar '92*** (Hyatt Regency Hotel, Lake Tahoe, Nevada).
Sponsored by the U. S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Sept. 21-23 ***Second International Conference on Training for Operation & Maintenance in the Nuclear Industry***
(The Moat House International Hotel, Stratford-upon-Avon, United Kingdom).
Sponsored by the Institution of Nuclear Engineers.
Contact: INE Conference Secretary; 081-698-1500 or 081-698-4750; Fax: 018-695-6409.

Nov. 15-18 ***Nuclear Energy Forum*** (Fairmont Hotel, Chicago, Illinois).
Sponsored by the U. S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

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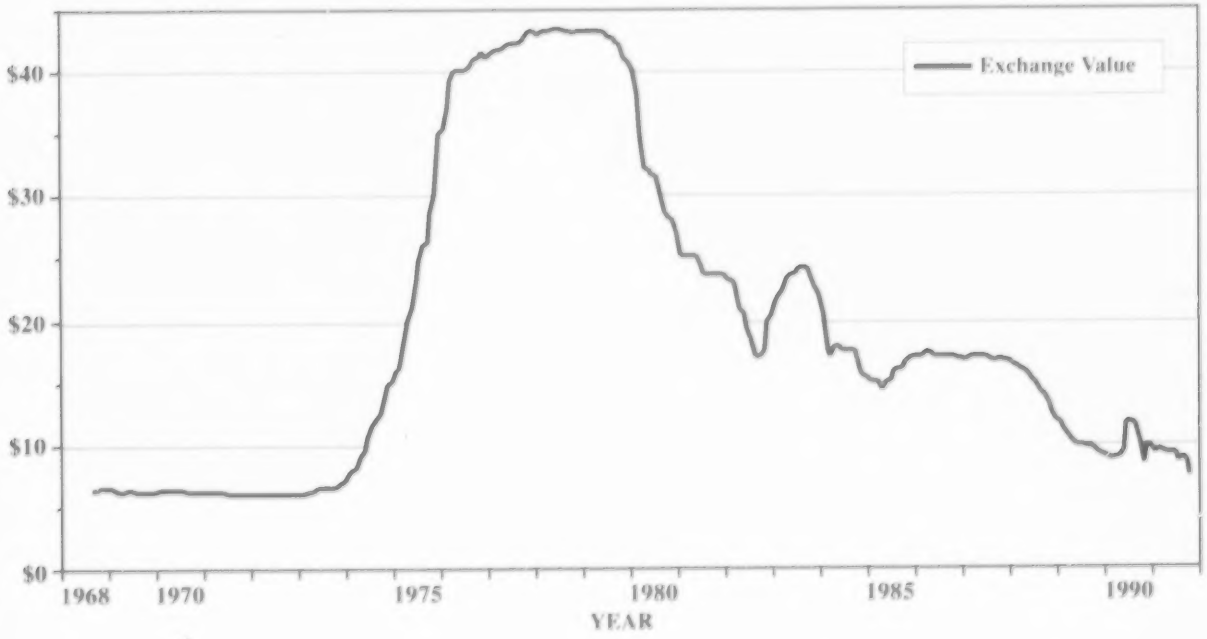
NUEXCO HISTORICAL EXCHANGE VALUE AND TRANSACTION VALUE

(in US dollars per pound U_3O_8)



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HISTORICAL MARKET VALUES

Exchange Values

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	9.00
1990	8.85	8.70	8.80	8.80	9.25	11.60	11.70	11.45	10.10	8.35	9.80	9.70
1991	9.10	9.50	9.30	9.10	9.20	9.05	8.55	8.75	8.40	**7.25**		

US Premium (Relative to the Exchange Value)

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

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UF_6 Values

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	26.50
1990	25.90	25.25	24.40	24.40	25.50	32.00	32.50	32.25	29.50	24.75	28.75	28.75
1991	27.50	27.75	27.50	27.25	27.60	27.25	25.75	26.25	25.50	**22.75**		

US Premium (Relative to the UF_6 Value)

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

Conversion Values

Determined as of the last day of the month indicated ($US/lb U as UF_6)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	1.65
1990	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
1991	1.45	1.45	1.45	1.45	1.50	1.50	1.50	1.60	1.55	**1.55**		

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HISTORICAL MARKET DATA

Transaction Values

Year	Determined as of the last day of the month indicated ($US/lb U_3O_8)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	9.40
1990	9.25	9.05	8.75	8.65	8.55	8.80	9.75	10.80	11.40	10.10	9.30	9.15
1991	9.40	9.45	9.35	9.30	9.30	9.20	9.15	8.95	8.70	**8.35**		

SWU Values

Year	Determined as of the last day of the month indicated ($US per SWU)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	54
1990	54	50	50	50	50	50	50	50	50	51	51	51
1991	51	50	52	52	54	59	66	67	67	**68**		

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Loan Rates

Determined as of the last day of the month indicated (Percent per Annum)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1990	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1991	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	**3.50**		

* Float with Prime Rate

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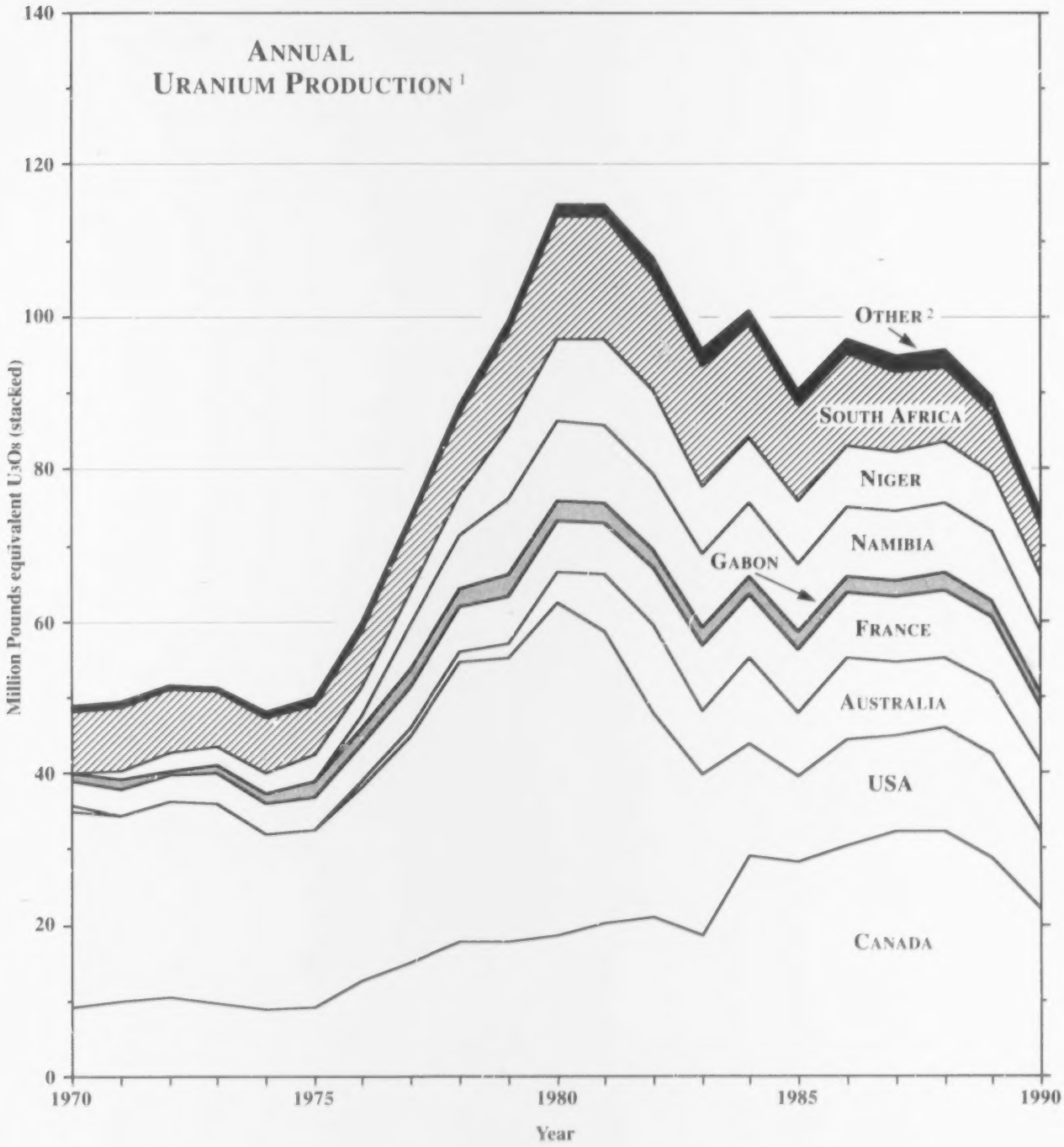
HISTORICAL MARKET DATA



[1] Estimated world uranium production in 1990 totalled 85.2 million pounds equivalent U_3O_8 —
(Australia: 9.1 – Canada: 22.0 – France: 7.4 – Gabon: 1.8 – Namibia: 8.0 – Niger: 7.4 – South Africa: 6.4 – USA: 10.2 – Other[2]: 2.2)

[2] **Other** includes: Argentina, Belgium, Brazil, India, Pakistan, Portugal, Spain, western Germany, and Yugoslavia

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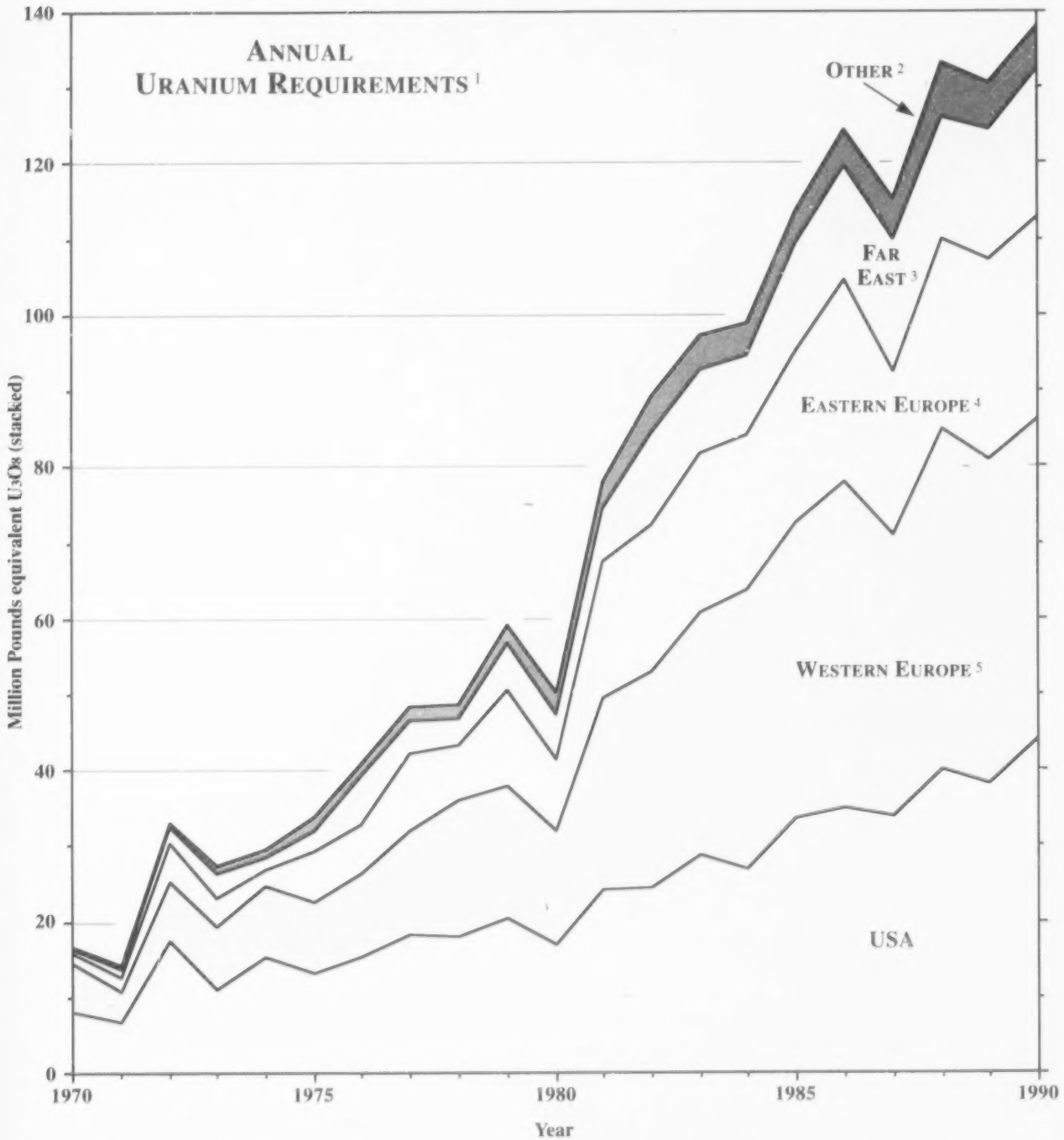

[1] Calculated by NUEXCO based on actual completion dates and operating performance, and NUEXCO's estimate of enriching tails assay.
[2] **Other** includes: Argentina, Brazil, Canada, India, Mexico, Pakistan, and South Africa.
[3] **Far East** includes: Japan, People's Republic of China, South Korea, and Taiwan.
[4] **Eastern Europe** includes: Bulgaria, Czechoslovakia, E. Germany, Finland, Hungary, USSR, and Yugoslavia.
[5] **Western Europe** includes: Belgium, France, W. Germany, Italy, The Netherlands, Spain, Sweden, Switzerland, and UK.

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GOVERNMENT STATISTICS

Australia

Year	Period [1]	Consumer Price Index [2] (1980/1981 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups [3] (1984/1985 = 100)	Average Weekly Ordinary Time Earnings — Adult Males — Australia [4] (Australian dollars)	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates [5] (June 1985=100)
1980	Avg.	95.8	83.1	—	69.6
1981	Avg.	105.0	85.9	—	76.1
1982	Avg.	116.7	89.0	—	86.4
1983	Avg.	128.5	96.9	—	89.9
1984	Avg.	133.6	98.0	—	96.0
1985	Avg.	142.6	107.3	—	100.0
1986	Avg.	155.5	101.5	—	104.9
1987	Avg.	168.7	108.9	465.88	112.9
1988	Avg.	180.9	111.8	496.90	115.4
1989	Avg.	194.6	117.0	534.65	126.0
1990	Avg.	208.7	123.4	571.43	129.6
Jan	1990	—	119.2	—	128.3
Feb	1990	—	120.8	555.80	128.3
Mar	1990	204.1	121.5	—	128.7
Apr	1990	—	119.9	—	129.0
May	1990	—	118.9	566.60	129.2
June	1990	207.4	116.6	—	129.8
July	1990	—	116.4	—	129.9
Aug	1990	—	122.4	574.10	130.0
Sept	1990	208.9	128.2	—	130.2
Oct	1990	—	134.1	—	130.4
Nov	1990	—	133.7	589.20	130.4
Dec	1990	214.5	128.8	—	130.6
Jan	1991	—	125.6	—	130.6
Feb	1991	—	121.5	597.70	130.6
Mar	1991	214.1	119.1	—	130.8
Apr	1991	—	117.6	—	131.0
May	1991	—	117.8	592.00	131.0
June	1991	214.4	120.4	—	131.0
July	1991	—	120.4	—	131.0 R
Aug	1991	—	—	—	131.2

P = Preliminary **R** = Revised since last month

[1] Monthly data for the period 1967 to 1990 appears in Report 278.
[2] Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1980 to June 1981 = 100.0). Figures shown at end of quarter represent quarterly average.
[3] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[4] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[5] Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (Catalogue No. 6302.0).

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Canada

		Industrial Products Price Index: All Commodities [1] (1986 = 100) [2]	Consumer Price Index: All Items (1986 = 100) [3]	Wage-earner Data: Average Hourly Earnings (C$) [4]				
				Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells (SIC 051-099)	Metal Rolling, Casting and Extruding (SIC 298)	Chemicals and Chemical Products Industries (SIC 372-379)
1980	Avg.	75.9	67.2	–.–	–.–	–.–	–.–	–.–
1981	Avg.	83.6	75.5	–.–	–.–	–.–	–.–	–.–
1982	Avg.	89.0	83.7	–.–	–.–	–.–	–.–	–.–
1983	Avg.	92.1	88.5	17.22	14.86	14.18	10.67	11.09
1984	Avg.	96.3	92.4	17.89	15.85	14.97	11.11	11.68
1985	Avg.	99.0	96.0	18.53	16.47	15.56	11.85	12.12
1986	Avg.	100.0	100.0	19.38	16.70	15.76	12.28	12.58
1987	Avg.	102.8	104.4	20.12	17.15	16.11	12.58	13.20
1988	Avg.	107.2	108.6	20.91	18.51	16.95	13.17	13.77
1989	Avg.	109.4	114.0	21.97	20.02	18.41	13.71	14.16
1990	Avg.	109.7	119.4	22.90	20.93	19.12	14.62	15.28
Jan	1990	108.7	116.9	21.88	20.39	19.03	13.99	14.78
Feb	1990	109.5	117.6	22.51	20.63	19.14	14.49	15.03
Mar	1990	109.3	118.0	22.52	20.75	19.17	14.99	15.07
Apr	1990	109.1	118.1	23.17	21.20	19.46	14.83	14.93
May	1990	109.6	118.7	23.28	20.55	19.01	14.71	15.06
June	1990	109.4	119.2	21.85	20.63	18.96	14.69	15.05
July	1990	109.1	119.8	20.92	20.18	18.66	14.34	15.20
Aug	1990	109.3	119.8	23.88	20.51	18.59	14.50	15.33
Sept	1990	110.2	120.2	24.41	21.19	18.94	14.48	15.63
Oct	1990	110.6	121.2	23.11	21.39	19.12	14.78	15.59
Nov	1990	110.9	121.9	23.38	21.83	19.48	14.93	15.73
Dec	1990	111.0	121.8	23.90	21.89	19.88	14.7	16.01
Jan	1991	111.1	125.0	23.79	21.79	19.78	14.66	15.89
Feb	1991	110.6	125.0	25.23	22.45	20.13	14.63	16.10
Mar	1991	109.8	125.5	24.19	22.22	20.27	15.21	16.47
Apr	1991	109.1	125.5	24.77	22.50	20.31	14.63	16.64
May	1991	108.6	126.1	24.38	22.17	20.25	15.05	16.55
June	1991	108.5	126.7	23.58	22.13	19.90	14.65	16.51
July	1991	108.2	126.8	24.70	22.33	19.93	14.56	16.36
Aug	1991	107.8	126.9	24.16P	22.08P	20.08P	14.66P	16.52P
Sept	1991	107.6	126.7	–.–	–.–	–.–	–.–	–.–

P = Preliminary **R** = Revised since last month

[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1990 is found in Report 278.

[2] New Base Year of 1986 as of Report 266. Previous Base Year was 1981.

[3] New Base Year of 1986 as of Report 264. Previous Base Year was 1981.

[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1990 is found in Report 278.

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GOVERNMENT STATISTICS

South Africa

		Average Declared Working Costs per Metric Ton of Gold Ore Milled [1] (Rand)	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled [2] (March 1982 = 100)	Consumer Price Index [3] (1990 = 100)	Production Price Index All Groups [4] (1985 = 100)	Total Employment in Mining and Quarrying [5]	Total Salaries and Wages in Mining and Quarrying [5] (1,000 Rand)
							Annual Total [6]
1980	Avg.	35.50	—	25.5 R	55.2	709,042	2,237,689
1981	Avg.	41.87	—	29.4 R	62.7	722,918	2,756,928
1982	Avg.	47.23	103.9	33.7 R	71.4	702,041	3,181,584
1983	Avg.	51.88	115.0	37.8 R	79.0	700,901	3,563,282
1984	Avg.	58.95	130.3	42.2 R	85.6	711,511	4,134,390
1985	Avg.	68.70	151.7	49.1 R	100.0	724,587	4,778,612
1986	Avg.	80.18	177.9	58.2 R	119.6	756,637	5,767,950
1987	Avg.	95.01	223.1	67.6 R	136.2	751,864	6,911,395
1988	Avg.	106.69	241.1	76.2 R	154.1	705,355	7,774,054
1989	Avg.	116.65	273.0	87.4 R	177.5	700,360	8,833,934
1990	Avg.	129.37	305.3	100.0 R	198.9	677,742	10,193,209
							Monthly Total
Jan	1990	—	—	94.2 R	188.9	688,837	801,616
Feb	1990	—	—	94.8 R	190.3	674,026	767,274
Mar	1990	126.74	296.3	96.4 R	190.8	704,660	780,614
Apr	1990	—	—	97.3 R	194.1	696,107	810,474
May	1990	—	—	98.3 R	196.6	613,527	719,191
June	1990	128.25	299.87	99.0 R	197.2	676,621	841,165
July	1990	—	—	99.7 R	197.3	697,242	913,177
Aug	1990	—	—	101.3 R	199.4	686,385	902,392
Sept	1990	129.46	312.55	102.9 R	202.2	689,317	922,454
Oct	1990	—	—	103.6 R	205.5	676,833	882,603
Nov	1990	—	—	105.8 R	212.7	669,198	909,418
Dec	1990	133.02	312.37	106.5 R	212.0	660,151	942,831
Jan	1991	—	—	107.7 R	216.1	648,944	935,839
Feb	1991	—	—	109.0 R	216.9	650,948	893,373
Mar	1991	137.66	323.82	110.0 R	215.3	651,843	924,930
Apr	1991	—	—	111.5 R	216.5	639,939	887,722
May	1991	—	—	113.2 R	218.4	630,481	887,107
June	1991	134.65	317.23	114.0 R	219.3	—	—
July	1991	—	—	115.5 R	221.2	—	—
Aug	1991	—	—	117.1	222.8	—	—
Sept	1991	137.11	329.05	118.7	—	—	—

P = Preliminary **R** = Revised since last month

[1] Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in Report 278.

[2] Page 16 of Report 178 contains description and calculation of index.

[3] Central Statistical Service, Pretoria: All income groups-weighted average, Historical Data by month appears in Report 278.

[4] Central Statistical Service, Pretoria: All commodities for consumption in South Africa.

[5] Central Statistical Service, Pretoria: Historical Data by month appears in Report 236.

[6] Annual total is shown, rather than monthly average, for indicated year.

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United States

		Producer Price Index [1]		Consumer Price Index [2]	GNP Implicit Price Deflator [3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$) [4]			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)	(1982-1984 = 100)	(1982 = 100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	85.7	10.26	10.63	8.31	6.94
1981	Avg.	97.4	98.0	90.9	94.0	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	100.0	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	103.9	12.58	13.43	10.58	8.66
1984	Avg.	103.3	103.7	103.9	107.7	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	110.9	13.38	13.74	11.57	9.46
1986	Avg.	100.0	100.2	109.6	113.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	117.7	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	121.3	13.24	13.26	12.71	9.79
1989	Avg.	111.6	112.2	124.0	126.3	13.59	13.72	13.09	10.05
1990	Avg.	115.8	116.3	130.7	131.5	14.10	14.36	13.54	10.32
Jan	1990	114.1	114.9	127.4	—	13.69	13.95	13.34	10.13
Feb	1990	113.6	114.4	128.0	—	13.70	13.99	13.27	10.16
Mar	1990	113.2	114.2	128.7	129.5	13.80	14.04	13.34	10.17
Apr	1990	113.2	114.1	128.9	—	13.92	14.30	13.53	10.17
May	1990	113.5	114.6	129.2	—	13.96	14.16	13.46	10.22
June	1990	113.2	114.3	129.9	131.0	14.00	14.31	13.51	10.27
July	1990	113.4	114.5	130.4	—	14.29	14.49	13.58	10.34
Aug	1990	115.9	116.5	131.6	—	14.27	14.60	13.57	10.33
Sept	1990	118.4	118.4	132.7	132.2	14.41	14.48	13.62	10.42
Oct	1990	121.4	120.8	133.5	—	14.43	14.58	13.72	10.47
Nov	1990	120.7	120.1	133.8	—	14.34	14.73	13.73	10.53
Dec	1990	119.0	118.7	133.8	133.1	14.39	14.69	13.75	10.57
Jan	1991	119.3	119.0	134.6	—	14.73	14.63	13.85	10.60
Feb	1991	117.2	117.2	134.8	—	14.80	14.55	13.81	10.59
Mar	1991	115.6	116.1	135.0	134.8	14.93	14.55	13.85	10.55
Apr	1991	115.6	116.0	135.2	—	14.85	14.56	13.96	10.63
May	1991	116.1	116.5	135.6	—	14.79	14.52	14.01	10.66
June	1991	116.0	116.3	136.0	136.1	14.88	14.51	14.05	10.74
July	1991	116.0	116.0	136.2	—	15.09 R	14.56 R	14.16 R	10.77
Aug	1991	116.4	116.2	136.6	—	14.84 P	14.62 P	14.04 R	10.78
Sept	1991	116.2	116.0	137.2	136.9	—.—	—.—	14.14 P	10.81 P

P = Preliminary **R** = Revised since last month

[1] US Bureau of Labor Statistics, Washington, DC: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents. Historical data is presented in Report 278.

[2] US Bureau of Labor Statistics, Washington, DC: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in Report 278.

[3] US Department of Commerce, Washington, DC: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 278.

[4] US Bureau of Labor Statistics, Washington, DC: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in Report 278.

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GOVERNMENT STATISTICS

Volume and Price of Uranium Deliveries To The European Community [1]

— Compiled from data published by the Euratom Supply Agency —

Year	Volume of Deliveries to the EC [2] (MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts [3] Average Price		Spot Contracts [3] Average Price	
			in ECU per pound U_3O_8	in US Dollars per pound U_3O_8	in ECU per pound U_3O_8	in US Dollars per pound U_3O_8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	4.5	ECU 26.92	$31.82	ECU 13.65	$16.13
1989	13,500	11.5	ECU 26.63	$29.35	ECU 11.04	$12.19
1990	12,800	16.7	ECU 23.08	$29.39	ECU 7.60	$ 9.68

P = Preliminary **R** = Revised since last month

[1] The twelve European Community member nations are Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.

[2] The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.

[3] For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar. Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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US Uranium Marketing Activities Statistics

— Compiled from data published by the US Energy Information Administration [1] —

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers [2] (million pounds U_3O_8)	Average Price of Delivered Uranium [2] ($/lb. U_3O_8)	Quantity of Uranium Imported [3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	$16.10	3.6	n/a	1.2
1977	29.9	27.8	$19.75	5.6	n/a	4.0
1978	37.0	31.6	$21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.0	20.8	$27.37	15.1	$19.14	1.0
1988	13.1	17.6	$26.15	15.8	$19.03	3.3
1989	13.8	18.4	$19.56	13.1	$16.75	2.1
1990	8.9	20.5	$15.70	23.7	$12.55	2.0

P = Preliminary **R** = Revised since last month

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity.*
1984-1990: Energy Information Administration, *Uranium Industry Annual.*

[2] Data for 1976-1981 includes both domestic utilities and agents.

[3] Includes imports by domestic utilities and domestic suppliers.

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